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HOSPITAL ADMINISTRATION

Quarterly Journal of the American College of Hospital Administrators

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VOLUME 3 SPRING 1958 NUMBER 2

The Editor's Page

● "New ways of accomplishing more things with fewer people in less time" is the way automation's versatile electronic devices were defined by Malcolm P. Ferguson, president of the Bendix Aviation Corporation, industrial behemoth of Detroit, Michigan, the first general assembly speaker at the 25th Anniversary Congress on Administration.

Mr. Ferguson's early morning phone-call from the plant reporting engine trouble with his private plane nearly pulled the panic switch on the program committee. However, in spite of the delay, the Bendix company's DC-3 touched down at neighboring Meigs airport only a quarter hour behind schedule and Mr. Ferguson, showing no visible signs of harassment, delivered his paper, "Automation: Its Significance to Management," some minutes later.

In his speech, Mr. Ferguson reviewed some of the impressive achievements of automated equipment, pooh-poohed the charge that the techniques result in unemployment, attacking the "myth" that automation puts machines in competition with men.

"No machine, however automated, can be trained to meet unforeseen developments or be endowed with an understanding of general objectives. Photoelectric cells can see certain marks, but they do not possess vision. Judgment, appraisal and imagination still belong exclusively to human beings," Mr. Ferguson said.

● Drawing liberally from one of the fundamental theses of his prize-winning book, *Administrative Behavior*, Professor Herbert Simon, associate dean of the Graduate School of Industrial Administration at the Carnegie Institute of Technology, encouraged administrators to "create an organizational environment in which creative problem solving can take place effectively."

"In doing this," Professor Simon writes in his paper, "The Executive as Decision-Maker," "he needs to pay particular attention to two things: his own time budget and techniques for building innovative activity into the organization structure."

● Operations Research—the study of complex man and/or machine phenomena to gain understanding for purposes of control and improvement—is reviewed by Thomas E. Caywood, Ph.D., in the article, "Operations Research as a Management Resource." Dr. Caywood, partner in the Chicago firm of Caywood-Schiller, Associates, explains how OR "pin-points the various parts of a problematic situation." "Studying the system as a whole not only guarantees that a solution will be operationally feasible but also points out the true dependence of each factor upon the others," Dr. Caywood states.

● To what degree should an administrator map a campaign to gain his objectives? According to Norman H. Martin, assistant professor of industrial relations in the School of Business at the University of Chicago, such a program of action is necessary "to convince, persuade, arouse emotions and to alter behavior in the desired direction."

Professor Martin believes strongly in the "substitution of deliberate, planned and preconceived action for spontaneous, catch-as-catch-can behavior." "If the executive does this, he will maximize his chances of success," Professor Martin asserts. How this can be done is spelled out in his paper, "Strategy in Administrative Action."

NOTES ON CONTRIBUTORS

MALCOLM P. FERGUSON, author of the lead article, "Automation: Its Significance to Management," is president of the Bendix Aviation Corporation of Detroit, Michigan, an organization with nearly 50,000 employees serving 21 principal manufacturing divisions with sales totalling more than $600 million. Mr. Ferguson joined Bendix as an engineer after being graduated from Syracuse University with a Doctor of Science degree. He became president of the corporation in 1946. In addition to his position at Bendix, Mr. Ferguson is a member of the board of governors of the Aircraft Industries Association, a member of the Society of Automotive Engineers, the Institute of Aeronautical Sciences, the Industry Consulting Committee of the National Advisory Committee for Aeronautics, chairman of the board of the Aircraft Industries Association, a director of the Michigan Bell Telephone Company, a member of the governors of Providence Hospital (Detroit), and a director of the United States Rubber Company.

HERBERT A. SIMON, Ph.D., is associate dean of the Graduate School of Industrial Administration, Carnegie Institute of Technology, Pittsburgh, Pennsylvania. His paper, "The Administrator as Decision-Maker," contains many of the theses from his book, *Administrative Behavior*, which won a $500 prize from a special Book Award Committee of the American College of Hospital Administrators for its "significant contribution to the science of administration." Dr. Simon was granted his Bachelor of Arts and his doctorate degrees from the University of Chicago. In 1939, he began his association with the Bureau of Public Administration at the University of California as director of the Administrative Measurement Studies. Leaving in 1942, he joined the faculty of the Illinois Institute of Technology and there served as chairman of the Department of Political and Social Science until 1949 when he left to take his present position. In addition to his prize-winning book, Dr. Simon is the author and co-author of *Models of Man*, *Public Administration*, and *Measuring Municipal Activities*.

THOMAS E. CAYWOOD, Ph.D., author of "Operations Research as a Management Resource," is partner in Caywood-Schiller, Associates, Chicago specialists in Operations Research. Dr. Caywood has been

in OR for the past 12 years. He received his Doctor of Philosophy degree in Mathematics from Harvard University and was a member of the faculty there as a special research associate in physics for some years before joining the University of Chicago as senior mathematician for the Institute for War Weapons Research. For some years. Dr. Caywood was affiliated with the Armour Research Foundation, where he organized, developed, and headed the Operations Research group responsible for the evaluation of military devices under study at the Foundation. Among his many affiliations, Dr. Caywood is a consultant on the Advisory Panel of Ordance for the Assistant Secretary of Defense (Research and Development); chairman of the *ad hoc* Committee to review the aircraft and guided missile vulnerability program; Fellow in the Operations Research Society of America and associate editor of the society's journal.

NORMAN H. MARTIN, Ph.D., incorporates material from one of his favorite studies, "the timing of action," in his article on the "Strategy in Administrative Action," Dr. Martin is director of research, Industrial Relations Center, School of Business, University of Chicago. He joined the faculty of the university in 1953 as assistant professor of the Committee on Human Development. After receiving a Bachelor of Arts degree in public administration from the University of Wisconsin, Dr. Martin attended the University of Chicago where he received a Master's degree in Sociology in 1948 and his doctorate in 1954. During his doctoral studies at the university, he was head of the Department of Sociology and Anthropology at Lake Forest College in Lake Forest, Ill. Among Dr. Martin's many publications are *Patterns of Mobility within Industrial Organization* (with Anselm L. Strauss), *Differential Decisions in the Management of an Industrial Plant*, *Thinking Ahead: Power Tactics* (with John H. Sims) and *Practical Politics in Administration*.

Some reflections on automation and the promise it holds to increase productivity—and enhance our standard of living

Automation: Its Significance to Management[1]

MALCOLM P. FERGUSON

AUTOMATION promises to make a basic impact on our economy—indeed, on our whole way of life—by offering a new means of productivity, a new way of expanding our output of goods and services. While the process is popularly associated with mechanical arts and the production line, automation will touch the hospital and medical fields in several ways. I think it will help us very much in understanding some of these specific applications if we first take a look at automation in its broader sense.

To give automation the sweeping definition it deserves, we can well think of it as a new way of accomplishing more things with fewer people in less time. This is why automation, or automated processes, are just as important to a hospital or a bank or an insurance company as they are to a guided-missile plant or an automobile assembly line.

In the factory the technique that we call "automation" is an amazing offspring of the combined sciences of mechanics, hydraulics, pneumatics, and electronics. It is capable of so increasing the quality and quantity of production that our advancing standard of living will surely be accelerated by its dynamic force.

Automation has been hailed in some quarters as a "second industrial revolution." Thirty years ago they were saying just that about the development of line methods of production—perhaps best typified by the mass-production system that turned out Model T Fords so efficiently that the cars could then be priced as low as $290.

Every generation is fascinated with the outstanding technological

[1] Presented at the twenty-fifth anniversary First Congress on Administration of the American College of Hospital Administrators held in Feburary, 1958, at the Congress Hotel, Chicago, Illinois.

advances of its own time. This was true of the steam engine, the electric motor, the telegraph, the telephone, and the wireless. The automobile, the coming of powered flight, and the harnessing of the electron were certainly revolutionary in their effect in our lives and on our material economy.

Through the whole history of technological advancement runs the constant urge and goal of producing more and more goods and services with fewer and fewer people. And while all this is going on, whole new industries are created which create more and more jobs. Thus the curve of total production, the truest index of the material wealth that we have, keeps on going right through the roof!

In our grandfathers' time, when the farmer plowed with the horse, we had three-quarters of our population on the farms laboring to feed themselves. Then came mechanization of the farm. Agricultural productivity expanded tremendously. But the true significance of this is not that farming became more profitable or less wearying. Its real impact was that it freed man from laboring most of the time just to feed himself.

PACE OF ADVANCEMENT

The cycle time before the original industrial revolution, when man developed the first practical machine power, was, of course, the *accumulation* of all previous history. Before that time, change in man's technological skill was slow—sometimes so slow as to be imperceptible. For generation after generation, life went on just about the same as before.

Since then the pace of technological improvement has constantly quickened, rising in a kind of geometric progression as each new advance provided more incentive, opportunity, knowledge, and even capital to explore still further the frontiers of science and technology. This exploration has gone forward at a faster pace not only in industry but in medicine, the arts, and, in fact, in every field that has enriched our lives.

Automation is the latest and undoubtedly the most challenging example of this rising pace of advancement.

This quickened pace of change—this self-energizing momentum—is dramatically illustrated in terms of the speed of flight. Back in 1903 the Wright brothers achieved the first powered flight in history. About forty years later there were airplanes that could fly 400 miles an hour. So we could say that it took forty years to get from 0 to 400. But in the next fifteen years we had manned aircraft that have flown at 1,600 miles per hour and rockets that go 18,000 miles an hour! And now science is talking in terms of 25,000 miles an hour.

This is the evolution of flight, not the revolution.

EVOLUTIONARY PROCESS

So it is with other technological improvements; they are really evolutionary, not revolutionary. The revolution comes in their ultimate effect. The line-production methods that Henry Ford applied to making automobiles (supposedly getting the idea from a visit to the Waltham watch factory) produced a car so economical and so practical that it changed the face of America. Without detracting one bit from the contributions of other automotive pioneers, I think we can accept the idea that Henry Ford put the nation on wheels with his mass-produced "Tin Lizzie." Now, aside from the massive automobile industry, the economic effects of all this are staggering. If we were to subtract the automobile from the American economy, we could start by cutting back every one of our cities and suburban areas to what was, back in 1900, the "end of the trolley line." When we think of the tremendous segment of the American economy that would not exist at all except for the fact that the whole country is on wheels, the very far-reaching effects of this technological change are obvious.

Looking ahead, we have, in automation, the means to a new plateau of productivity and a new era of industrial progress. It is a way not only of doing things faster, better, and easier than we ever did them before but, in many cases, of accomplishing tasks that previously we could not do at all.

Modern communication is certainly a case in point. A prominent corporation in the electronics field reports, for instance, that about

80 per cent of its volume is in fields that either did not exist at all or were not commercially developed ten years ago. When we see automation in this light, I think we will agree that it is not a bolt of lightning that will transform us in a flash but part of a pattern of change whose probable ultimate effects stagger the imagination.

These are some of the broader aspects of automation. But just how do we know automation when we see it?

To some persons whose interest is concentrated mainly on the metal-fabricating industries, automation means simply the use of automatic transfer machines and equipment for moving work pieces from one machine tool to the next. At the opposite extreme are those who regard automation as a completely new approach not only to industrial processes but to problems of human organization in general. Finally, some popular writers use "automation" as a catchword which they apply indiscriminately to almost all forms of technological innovation.

AUTOMATION DEFINED

So we have in automation a new word that is not yet used with very much consistency. But the more serious students of the subject have refined its definition, and they see it as covering three different types of very progressive manufacturing.

The first is the use of new and more complicated machine tools which perform, as one operation, processes that had previously been performed as a long series of separate operations by separate machine tools, each individually operated. Another type of innovation usually described as "automation" is the use of automatic "feedback" devices, or "servo-mechanisms," that observe the work that a machine—or, indeed, a whole factory—is doing and act upon those observations in automatically adjusting the operation so it will not vary from pre-set specifications. A third type of change often discussed under the heading of automation is the use of electronic devices in administration and engineering to record, store, process, summarize, and interpret information.

Automation, therefore, is not one thing but three or more separate things.

SIGNIFICANCE OF AUTOMATION

We have had automatic machinery replacing hand labor, increasingly, for centuries. Now we have automatic controls more and more replacing human controls in the supervision and direction of these automatic machines. This suggests another definition for automation. It is *the automatic control of automatic machinery.*

Control units that have a "sensing unit" for monitoring a process and an "activation unit" for controlling a process or making necessary corrections are not new in principle. The primitive centrifugal-weights "governor" James Watt invented in 1788 to keep his steam engine from running too fast was exactly that! But developments in electronics, with a time response of a millionth of a second, including new components such as transistors (that involve a new specialty that we call "solid-state physics") and printed circuits, have greatly increased the dependability and the versatility of these systems. It is already apparent that electronics is one of the great factors in the future of automation—so much so that the art might well be called "electromation."

SCIENCE OF THE ELECTRON

Electronics is the science that deals with the electron, a very small particle found in nature. About thirty thousand trillion electrons (that's the figure: 30 followed by 27 zeros) weigh less than an ounce. Electronic energy, as in a radio wave, for example, moves at the speed of light. Because we can amplify, code, broadcast, compare, and do dozens of other things with different cycles or pulses of electronic energy, we have a practical means of supplementing man's senses and brain power.

Electronics can hear, see, smell, touch, and taste. Regarding the first two of these human senses, the electronic mechanism not only can hear and see for us—as in radio and television—but can play it back so our own senses can have the sensation re-created. Of course, in the case of smelling and tasting, we have not yet reached the point where electronics can play it back and reproduce a smell or a taste for human enjoyment, but electronic machinery has been developed that can accurately and efficiently sense the things that are causing

a smell or a taste and take action appropriate to the desired industrial process.

(Electronics might be said to date as a practical science from Dr. Lee De Forest's invention of the vacuum tube in 1906. The vacuum first revolutionized the communications industry, as you know. Then electronics was given tremendous impetus by aviation, which today, for all practical purposes, would be absolutely grounded without electronic equipment. Here I am thinking not only of aircraft communications, instrument flight control, radar, and some of the more dramatic electronic systems but of other aviation uses of electronics that more nearly parallel the kind of things that go on when we apply electronics to a factory or office.

THE PILOT'S FRIEND

For instance, the advent of multiengine aircraft produced a very fundamental design problem. There have to be four engines out there on the wings. In order to stay in the air very long, the pilot must know in his cockpit a lot of basic information about what is going on with those engines—such things as revolutions per minute, temperature, oil pressure, manifold pressure, propeller pitch, and so forth.

One way to relay this information to the cockpit would be to install a system of cables, plumbing, and other gear to activate indicators on the pilot's instrument panel. Since this was impractical, an answer to the problem was found via electronics.

What happens when a sensing device on a particular engine—a valve that turns as oil flows to the engine—is connected to a tiny, precision-built, non-rotating electric motor called an "autosyn" or "synchro"? The autosyn becomes an electrical position indicator, and, when it is connected by means of a fine wire to a similar unit in the cockpit, the second autosyn will very accurately assume the same position as the first. When the faint electrical current that causes these two synchros to duplicate each other's position is electronically amplified, there is enough energy to actuate an instrument-panel indicator, which presents the oil-pressure information to the pilot.

These versatile little devices, hooked in pairs, in series, or in all

kinds of combinations, are found by the hundreds in the new high-performance airplanes—at least three hundred and fifty in a modern bomber. They are used not only in the instrument systems but in all the other automatic systems, such as the automatic pilot or flight-control system, engine control, air conditioning and pressurizing, and numerous others. The synchro principle further permits an electrical signal to tell some piece of power equipment to go into action to raise the landing gear, lower wing flaps, or move the rudder controls. The power equipment, in this case, is called a "servomechanism," a term that has come to be associated with a broad area of automation.

Of courses there are many automatic control systems in airplanes and in certain types of manufacturing today that are much more sophisticated than the process I have just described. But I think you see the point that, in meeting the problems of aviation, "know-how" was evolved that now applies to many automation techniques and devices.

"AIRBORN AUTOMATION"

A new jet airplane, for instance, is so fast that we have to have a completely automatic system to measure, or meter, precise ratios of fuel and air to the engine, or it will "flame out" or stall. So we have a system that automatically senses the speed of the inrushing air, its density, temperature, humidity, and several other factors, and instantly computes and supplies the proper ratio of fuel to make the engine operate at maximum efficiency. All this is happening so fast that it would be impossible for the human pilot to "run it," even if he had nothing else to do. Here is a case where electronics and hydraulics not only do a better job but do a job that otherwise could not be accomplished at all.

Let me cite another example of "airborn automation," a Bendix development called the Central Air Data Computer that co-ordinates a supersonic aircraft's whole "nervous system"—receiving and acting upon all atmospheric information necessary for supersonic flight. The Air Force has ordered $7,500,000 worth of these devices for the Republic F-105 and McDonnell F-101B supersonic fighters. What

this air data computer actually does is to make certain basic measurements of the air through which the plane is flying, correct these for errors in the sensing units that are caused by high-speed flight, convert them through computation into required information, and then distribute the information to all the automatic systems of the airplane. These systems include flight control, fire control, engine control, bombing and navigation, reconnaissance, and air conditioning.

An airplane flying at supersonic speeds develops some terrific pressures and temperatures around it, and it is the job of the air data computer to sense these and convert its findings into control information. The fire-control system needs, for example, instantaneous computations of air density multiplied by the speed of sound. From its own basic measurements of temperature and pressure, the computer accurately calculates air density and the speed of sound, multiplies these two figures, and then sends the final answer to the system. This device has 46 synchros, 511 gears, 820 ball bearings, and a total of 2,781 major parts—with most tolerances held to one ten-thousandth of an inch!

"HUSTLER'S" NERVE CENTER

One of the most exciting examples of "automation in the air" is the Air Force's Convair new B-58 bomber called the "Hustler." This airplane is so fast that it would be impossible for man to fly without a control system that "thinks for the pilot." The range of aerodynamic forces encountered by this airplane is such that the control-surface movement needed to induce a given maneuver may vary from 20 degrees to eight-tenths of 1 degree. Moreover, because of its extreme speed, the hydraulic actuators, or "servomechanisms," that move the control surfaces require six thousand times more power than is needed to move the controls of a modern airliner.

The Hustler's control system begins in its long, needle-like nose, where sensing units pick up atmospheric data. The computer electronic amplifier in the control system uses three miles of wire and 140 transistors. It computes the effects of speed, altitude, weight, center of gravity, attitude, and temperature and translates them into control

commands. A 267-pound device called the "power control linkage assembly" permits the pilot's easy control-stick motions to be translated into aerodynamic control-surface motions that conform properly with all the critical air-environment and flight-attitude factors I have just mentioned. Without this automatic system, the slightest "overcontrol" by the pilot might tear the plane to pieces.

AVIATION: DEVELOPMENTAL SOURCE

Guided missiles, of course, operate as a result of sensing and actuating devices for their electronic and hydraulic "packages" that guide them to their targets. Missiles also involve a specialized form of electronic communication that is called "telemetering," which I will mention later.

These are just a few of the reasons why aviation has made the broadest uses of the electronic processes that are automation in themselves. Today's aviation is proving to be a development source for many such techniques which subsequently will have great industrial and scientific applications.

Time does not permit a detailed review of the many ways automation has been applied to machine tools and processing machines and to packaging, handling, and transfer equipment.

Most of you have probably seen one of automation's most interesting accomplishments—the automatic bowling-pin setter. It uses a large number of automatic principles, including conveyor, transfer, distribution, switching, and electric-eye control.

CIGARETTES AND PRETZELS

I am sure one of your first views of automation was the cigarette-making machine in a New York window. Today these machines make, package, and carton a hundred and fifty packs per minute. Even the simple pretzel has gone automation, and we have a machine that pulls, forms, twists the dough, bakes the pretzel, and packages it—fifty packages per minute. And the toothpaste you use so frequently depends entirely on an automatic process that fills, cleans, folds, closes, and

packages at the rate of a hundred and fifty a minute.

A good example of what has been called "Detroit automation" is the Chrysler Qualimatic Engine Plant. It has hundreds of machines operating almost as one and can turn out three thousand engines in twenty-four hours. The plant covers 600,000 square feet and cost approximately $50,000,000.

I would like to describe in a bit more detail one of the latest forms of machine automation utilizing what is called "electronic numerical control," or tape control. This new example of automation, built by Bendix for Martin Aircraft under an Air Force contract, is a fifty-ton, three-axis milling machine with associated electronic equipment that virtually makes intricate parts from blueprints.

The tape-controlled process was first used in mass production by Bendix to solve a bottleneck in the manufacture of a small, intricate three-dimensional cam that is one of the key parts in a jet-engine fuel-metering system. In this instance, production of one "master cam" was previously a one-man job requiring from ten to fourteen weeks of highly skilled work. With the tape-control process, that operation can now be completed in from two to four days.

TAPE CONTROL PROCESS

In the tape-control process an engineer puts down on a process sheet the dimensions of the part to be made as determined from the blueprint. These figures are then typed on a special typewriter called a "Flexowriter" that produces at the same time a preliminary tape on which the blueprint information is punched in code. This preliminary tape is then fed through a special electronic computer to produce the actual control tape which represents the actual piece to be made. The finished control tape is then played back through the same computer and actuates the special controls on the milling machine, or other types of machines, to produce the piece itself—one or many.

The three-axis cutting motions of the machine are continuously monitored by feedback controls capable of detecting a motion of as little as two ten-thousandths of an inch. "Feedback," a word you will be hearing with increasing frequency, is part of a closed-loop system

in an automated device that brings back information about the condition to be controlled for comparison with the desired specifications, or target value.

Martin is using this newest example of heavy-industry automation in making parts for the TM-61 Matador tactical missile, with quite remarkable savings in production "leadtime" and tooling costs. Twenty-two additional milling machines employing this Bendix tape-control system were recently ordered by the Air Force.

Changing the "production run" on a tape-controlled machine tool is a relatively simple matter of changing the tape. Then, if an additional quantity of something made last month or last year is needed, the tape for it—which can be stored indefinitely—need only be pulled out of the file. If the design at some point needs to be changed, a new section of tape covering the change can be spliced in. In the event of a national emergency, duplicate tapes can be made and sent all over the country to plants that have similar tape-controlled manufacturing processes.

FURTHER APPLICATIONS

To look beyond the defense industries, I think it is apparent that this process will have numerous other applications. In big manufacturing operations, such as the automobile plant, the tape-controlled process, or numerically controlled milling, could produce the dies for a major model change-over in about one-fourth the time now required. In small or medium-size industries the tape-controlled machine tool offers the prospect that small lots of parts—say, a few hundred—can be made economically because intricate and expensive tooling is no longer required.

In the hospital, automation may have already affected your operations and equipment; we can envision electronics being widely adapted to marvelous new equipment for diagnosis, treatment, and control. Industrial developments embodying precision, reliability, and hydraulics are today being applied to such wonderful equipment as the heart pump. Those phases of hospital operation associated with communication, accounting, and records of all kinds will benefit from similar applications in business.

One application of automation in industry that has already touched the hospital field—in this case electronic and ultrasonic—is the new ultrasonic cleaning equipment for surgical instruments and other apparatus.

ULTRASONIC CLEANING

We became interested in the advantages of using ultrasonics, or high-frequency sound waves, in Bendix to meet the problem of cleaning precision-built aviation components. Our system of ultrasonic cleaning operates with an electronic generator that converts ordinary 60-cycle electrical power into a current that has 18,000 cycles per second. This current is fed to a device called a "transducer," which expands and contracts in sympathy with these high-frequency electrical impulses and thus transforms the electrical energy into physical energy. This energy is introduced into a liquid bath, usually water or a simple water detergent, that vibrates with sound waves that are beyond the range of human hearing. As the sound waves pass through the water, they produce an effect known as "cavitation." Tiny voids or vacuums are created that implode or collapse, effecting a microscopic scrubbing action that uniformly reaches every crevice, every blind hold, and every surface of the part to be cleaned. In industry, lapping compounds and cutting oils that resisted vapor degreasing and cleaning with solvents have yielded readily to "cavitation" or "cold boiling." Today such cleaning equipment is being widely used for precision parts of all kinds, glass, mirrors, and even complete generator assemblies, radio chassis, and entire jet engines. In many cases it is being built into automated processing lines.

Following the successful application of ultrasonic cleaning to industrial application problems, an ultrasonic unit specially designed for cleaning surgical instruments was developed and marketed. They are now in use in twelve major hospitals—including Passavant Hospital here in Chicago.

Experience in the hospitals using our ultrasonic cleaning unit shows that one load of 100 instruments can be completely processed every 3 minutes. This compares with approximately 60 minutes required for hand washing.

A typical example would be a hospital with four operating rooms which might average at least sixty surgical cases per week or three thousand in fifty weeks. With the normal kit now containing up to 120 instruments, the hospital might be required to clean over 300,000 instruments per year. Present methods indicate that 30 seconds is a practical minimum for inspection hand-scrubbing and reinspection for each instrument, so that 2,500 hours of tedious, constant hand labor are required.

EXCEPTIONAL EFFICIENCY

The ultrasonic cleaner now makes it possible to clean the year's 300,000 instruments from four operating rooms in only 150 hours. Ultrasonic cleaning techniques also have been extended to syringes, processing them at the rate of 1,600 per hour, and to such things as tubing and laboratory glassware.

These industrial applications point up some of the problems of automation.

In the first place, automation can occur only as fast as man can dream and devise the process and the machinery and as existing or new industries can design and produce the necessary equipment. But, while these industries may expand very rapidly, there are other factors affecting the change-over.

A CAPITAL IDEA

One of the most important of these is capital. Automation can occur only as fast as business firms can raise the capital needed to devise and build or purchase these fantastic developments of our inventive genius. Thus the health of our security markets, the increasing pressure of taxation, and the growth of our personal savings will all play a major part in such industrial progress.

The industries which have made the most progress toward continuous operation in the past are the very industries which have the largest investment per worker. Leaders are petroleum and coal, with $105,000

and $28,000 assets per employee, respectively. Near the bottom are apparel and finished fabric products, with assets per employee of only $2,160.

To many of you the further question is: "Will it pay for itself?" I wish I might offer a ready formula for this knotty question. It is no different, however, from such problems of the past, but, somehow, the chips are bigger. We must also ask ourselves not whether we can afford it but whether we can afford not to do it in the face of today's severe competition and increasing labor costs. To assist in this evaluation, many industries are establishing separate application study groups, and this approach may appeal to some of you with your particular problems.

REQUIRES SKILLED MANPOWER

Another key consideration in progress toward automation is the tremendous demand it creates for skilled manpower. The new equipment cannot be designed or built until there are sufficient trained people to accomplish this first step—and no business is going to make an expensive change in equipment or methods without first making sure that the trained manpower is available and their skills upgraded as required.

However, of all the factors that will determine the speed and direction of automation, one of the most important is what people think about it.

"Wholehearted acceptance" of automation is most common among representatives of management. Many go so far as to say it is absolutely *essential* to attainment of national goals.

Ralph J. Cordiner, president of General Electric, testified at hearings held to explore automation and technological changes that the United States will require an estimated 40 per cent more goods and services by 1965, though it will have only 14 per cent more people in the labor force. Industry must be encouraged, he said, to invest in more productive machinery and methods. Faster progress in the new field of automation seems to us to be the only available solution to this program, Mr. Cordiner said, particularly in situations where we have exhausted the known economic possibilities in the more familiar field of simple mechanization.

Where does organized labor stand in this all-important matter of public attitudes toward automation? George Meany, president of the AFL-CIO, recently expressed an attitude very close to wholehearted acceptance of automation. He was quoted as saying, in part, that "automation, coupled with atomic power, will change the lives of all of us" and that "labor sees no reason to fear the time when factories will be run virtually on an automatic basis, with machines operating machines." He went on to say that there will still be plenty of work to be done by people, and, "if it becomes possible to put into effect a shorter work week to maintain full employment, let us promptly accept this opportunity to lighten the burdens of the American people."

AUTOMATION AND LABOR

Most labor leaders seem to accept automation, but with some reservations. They agree that automation is a good development, but some of them insist that planned intervention—either through government or through collective bargaining—is necessary to protect the people against the alleged bad side effects of automation. I think you know that I do not share the view that there are so-called bad side effects to automation, nor does history justify them.

Let me give you another example of automated processes that, I believe, help to put this very broad subject into focus.

In the operation of guided missiles, we have been using for some time a process known as telemetering. This involves the simultaneous coding, transmission, and recording of as many as five hundred types of information about the behavior of a missile in flight, all in approximately two minutes. The information is received on the ground in the form of electrical impulses that can be logged on charts and then evaluated. Now, we have a commercial application of this same principle in a system that we call "digital transmission equipment." It is a new system of measuring and monitoring at a distance that permits "push-button" operation of complex industrial processes going on as far as a hundred miles away. It is applicable in almost any situation

where it is desirable, or geographically necessary, to separate a human supervisor from the device or installation he is supervising. The system can operate over existing communications facilities, such as telephone and telegraph lines, and over very high-frequency microwave radio bands. It operates on the digital computing system, measuring or sensing in terms of numbers, or coded "commands," which are translated into action, such as the automatic positioning of shafts, off-or-on switching of motors, pumps, and valves, or measurements of temperature, pressure, or other variables.

TELEMETERING

To illustrate how this system would work in a remote tank-gauging system in the petroleum industry, an operator, connected by a single-wire circuit to a tank farm, would "interrogate" a specific tank by dialing its number on his telephone dial. Instantly, the level or volume reading of that tank appears in figures before the operator, and he or she then proceeds to interrogate any or all of the other tanks in the field to obtain their readings.

Telemetering has had a particularly important application to human behavior in flight. We have instrumented many pilots with equipment for automatically radioing back to a flight-control station what is happening in flight to their pulse, blood pressure, temperature, and various reactions.

HOSPITAL APPLICATION

I understand that this type of equipment has already been applied to hospital operative requirements in some locations whereby an automatic recording apparatus located in or adjacent to the operating room will give a continuous indication and record of a large number of human behavior factors. In this case, of course, the transmission is by wire rather than by radio, but the same result is obtained.

The petroleum and chemical industries have many operations that are typical of the continuous-flow process which lends itself readily

to automation, and these industries have, in fact, pioneered in the use of many automated devices for control of pipelines, refinery processes, and the handling of chemicals where it is desirable to avoid coming into direct contact with them. Thus we see another important phase of automation in its safety possibilities.

In the factory, automation will affect not only direct machine operations but perhaps to an even greater extent such auxiliary operations as inspection or quality and assembly. Automatic measurement and the use of feedback for machine control are essential to an efficient automatic process—it is called "autometrology." Autometrology deals with highly sensitive gauging and measurement systems that "think," record, and control piece sizes through all stages of manufacture, assembly, and inspection. Automatic, split-second signals from the gauging and measuring instruments are flashed back to machine tools producing individual parts. The signals sense and detect off-size dimensions as soon as they occur, or detect a trend, and automatically place a "stop order" on the machinery to halt production until corrections to the proper size are made. In the field of autometrology we are frequently talking about very minute measurements or tolerances, even millionths of an inch. To give you an idea of how fine a measurement one-millionth of an inch is, the engineers point out that, when a fly lands on a railroad track, the rail sags one-millionth of an inch!

ANOTHER ASSET OF AUTOMATION

This business of precision measurement and the ability to make things, on a production-line basis, to finer and finer tolerances is very much a common denominator of technological progress. When James Watt devised his steam engine, we are told, he succeeded in fitting the pistons to a tolerance of "the thickness of a worn shilling," or about one-fortieth of an inch. Imagine the engine of your automobile if it were built to such crude tolerances. The automobile serves as a good example here because, when you think of the wonderful performance and reliability of today's cars as compared with those of, say, thirty-five years ago, you have to realize that the performance you

have today would be impossible without very finely machined parts that fit together and run together with incredible smoothness. Achieving these fine tolerances requires such measurement devices as the air gauge, where the perfection of a part is tested by a method that measures how much air under pressure can get past the part when it is fitted into a space of the required dimensions. So we see another asset of automation—quality improvement and control.

In discussing some of the more exciting developments in the field of automated manufacturing, I have not yet mentioned the computer as a tool in itself or the extension of automation by computers to one of its most promising fields, which is the office. Besides serving as part of a system for control, the computer in itself is having a profound effect on technology. Much has been written and said about the marvelous things computers can do, and almost every day's newspaper carries a story or picture about some new electronic "brain" of awesome proportions and capabilities.

BARGAIN PRICE COMPUTER

While these large million-dollar-and-up electronic computers are achieving fantastic results in the field of pure science and in certain special tasks in business and industry, it is the smaller or general-purpose computer priced below $75,000 that holds the most promise of becoming an everyday business and industrial tool. As an example, a leading highway engineering firm recently announced development of a system, using a general-purpose computer, that cuts highway survey and engineering time to one-thirtieth of what otherwise would be required—it calculates where a road should go for matching cut and fill. You can imagine the millions of dollars saved, plus the time of the engineers involved, in the application of such a computer to a major highway program.

In the office you may have a machine that will prepare the whole payroll, we will say, in an hour. Many an office will have such machines. I might point out here that machine-made unemployment as a result of computer "brains" is a misconception. A survey shows that in 1940 we had in this country some five million people employed in

clerical work. Today the figure is eight to ten million. Clerical work amounted to 10 per cent of total employment in 1940, while today's clerical workers make up 15 per cent of the total working force. In fact, the long history of the arithmetic machine, from abacus to adding machine, cash register, calculator, and punched cards, shows that, the faster the machine process, the more jobs the machines created for the men who work the machines.

Electronic computers in several forms will have their application to the hospital systems of the future. For instance, industry is now working on a plan to accumulate employees' wages or salaries automatically and continuously and then to use them for a continuous means of cost recording and control. Suppose each employee has a metal tag on which is key-punched complete information, including name, classification, rate, address, etc., which, when inserted in a time clock, automatically records the tag and time-clock information in a computer memory system wired from all clocks with additional information being piped in as that employee is assigned to various duties and jobs. The computer then calculates, records, and even prints complete salaries or wages and costs of thousands of different operations as desired.

AUTOMATION FOR ALL

There is some concern that these great technological changes will be unfavorable for the continued growth of small business. History does not so indicate, and I am not one who shares this concern. Such changes will create not only new jobs but thousands of new businesses. The automation industry itself must produce devices both large and small. There will be small businesses in engineering, development, sales, servicing, and maintenance of product, and the inventive spark that has founded many new concerns in the past will be even more prevalent. A visit to any automation show will demonstrate such trends.

Nor will the use of automation be the exclusive domain of the big corporations. It will be adopted, whether by large or small business, if—when all the eventual costs are totaled up—it is actually cheaper and/or better than continuing present methods.

The ultimate significance of automation is that it is a way of increasing productivity—and hence our standard of living—to a degree which is almost impossible for us to imagine in the light of previous experience. Most assuredly, it is a new guaranty of the continual process of change that has marked all human progress. But the basic changes it will make will not come overnight, though the pace of change may certainly increase. The switch to automation will be a gradual process governed fundamentally by the market place or, in other words, by economic considerations.

It should be noted, for instance, that automation in the office does not mean that we shall do the same things with machines that are now done with human effort. The function of the office is to collect, store, interpret, and report on information. With superior methods for doing these things, business will collect and store more information, analyze it better, and act on it faster.

CREATES NEW OPPORTUNITIES

The primary impact of automation on society will be to create new opportunities—opportunities for new skills, for raising standards of living, for increasing military strength, for earning a living in a more rewarding and interesting way, and for setting up profitable business in fields that may be almost unknown at present.

To say that automation will cause labor displacement is by no means equivalent to saying that it will bring about unemployment. There is the classic example in the blacksmiths who were put out of business by the automobile. It would take a month, however, to enumerate the new opportunities for earning a living that were created by the automobile age. There is also the case of the telephone industry, which began about 1920 to use automation in the form of dial-telephone equipment. Since 1920 the operating telephone companies have more than doubled their employment. The use of continuous-flow methods in the oil industry also began about 1920, and this industry's employment also has about doubled.

A real danger is that fears about the so-called bad side effects of automation will slow it down by imposing an additional cost upon

production. If such burdens offset the savings from increased efficiency, the incentive for technological improvement may be impaired or destroyed.

The only connection between automation and unemployment is the problem of labor displacement—the need for people to adapt themselves to new jobs and new opportunities. People will shift from lines of work in which their services are no longer needed to other, often better, jobs. There is no virtue in keeping people at work making more automobiles than are actually needed. Farm mechanization would have been largely pointless if we had insisted on keeping three-quarters of our population on the farms.

Automation will be adopted by large or small business if, when all the eventual costs are totaled up, it is actually cheaper and/or better than continuing present methods.

INGREDIENTS OF PROGRESS

One final word on this myth that automation somehow puts machines into competition with men: No machine, however automated, can be trained to meet all unforeseen developments or endowed with an understanding of general objectives. Machines can be built with a memory for recording past events, but they cannot be built with imagination for spotting new possibilities. Photoelectric cells can "see" certain marks, but they do not possess "vision" in the higher sense. These functions—judgment, appraisal, and imagination—still belong exclusively to human beings.

In our concentration on this topic of automation, which emphasizes inanimate things—new and fascinating combinations of metal and wires and vacuum tubes and transistors—let us not forget that all progress is of human origin. The driving force of ambition, the unpredictable course of man's inventiveness, his knack of using his freedom of enterprise to build organizations that produce useful things and create income-producing jobs—these are the indispensable ingredients of progress.

What people are inspired to do, or prevented from doing, will control what really happens to automation.

The administrator needs people in his organization who have talent for innovative problem-solving and who have the creativity, judgment, and wisdom to respond to new challenges as they arise

The Administrator as Decision-Maker[1]

HERBERT A. SIMON, PH.D.

LOOKING at the practice of industrial management today—the part of management that I am most familiar with and most active in—we see that, in the course of the last ten years particularly, changes have taken place and new ideas have been introduced which are making substantial changes in the face of management.

During the last ten years there has been a tremendous acceleration in the application of systematic and scientific—and, in many cases, mathematical—procedures to many aspects of what might be called "business routine." By that I mean the day-to-day, repetitive kind of decision-making that takes place at the lower and middle reaches of organizations.

Much of this change has gone on under a new label—under the label of "operations research," sometimes under the label of "management science." But, whatever label it uses, it consists again in the application of the best systematic techniques that we know, of the best kind of research practices we know, to the problems of behavior and decision-making in administrative organizations.

Not much of these new developments in operations research and management science have, as yet, touched directly the job of the executive. Because the executive, by the very nature of his job, is, or should be, something of a fifth wheel when it comes to carrying out the day-to-day and hour-to-hour tasks of his organization, he is not the major participant in the repetitive routine and day-to-day decisions. And so, insofar as the new developments in the management sciences have primarily affected those decisions, the executive at middle and higher levels of the

[1] Presented at the twenty-fifth anniversary of the First Congress on Administration, American College of Hospital Administrators, Congress Hotel, Chicago, February 10, 1958.

organization has perhaps been the person least affected.

What I would like to examine at some length is my conception of the executive's main responsibilities. If he is this kind of fifth wheel when it comes to the day-to-day business of the organization, why do we have him around? What is he for? What good is he?

What is the job of the executive? If we make a fundamental distinction between those things which can be carried out in a more or less systematic, repetitive, programed way because they have been done before and because they have been thought through before, we make a distinction between those activities and the kinds of problems that arise in every organization which require new and innovative thought because they are new problems, because they have not been thought through before, and because they have not occurred repetitively. However harried he finds himself, however much the day-to-day problems of the organization impinge on him, a major, if not *the* major, responsibility of the executive at the top level of organization is to free himself sufficiently from the day-to-day concerns so that he can take major responsibility and exercise major leadership in attending to the novel tasks—the tasks of adapting his organization to new problems, to new challenges, to new environments.

IMPACTS ON THE HOSPITAL

You all are familiar with examples of the need for innovative change and response to these challenges that have taken place in the hospital field in the last generation. From an outside layman's point of view, it is obvious that the changes in the sources of hospital support attendant on the development of the Blue Cross organization and attendant on the growing prosperity of our country must have had major impacts on hospital organization.

In addition, the changed professional structure within the medical profession—the continued growth of specialization and the continued and the increasing complexity of the relations among specialists in the treatment of patients—must have a major impact on hospital organization.

The growth of your own profession as a profession and the identifi-

cation of the role and job of hospital administrators must themselves impose a major impact on hospitals.

The rapid change in what we in manufacturing would call the "product mix" in your hospitals, that is, the cross-section of the kinds of patients that you are dealing with at any one time, particularly the relative significance of the acute illness and the chronic illness in your total hospital picture, must also require a substantial change in your administrative thinking.

CHANGE INTERNAL STRUCTURE

All these things have been major and important changes in the environment that has affected hospitals over the past generation, and a hospital which was appropriately organized and managed to do the job that had to be done a generation ago is almost certainly not—without considerable change in its internal processes—properly organized and managed to do the hospital job today.

The most important task of the leadership of hospitals, the hospital administrator and the senior medical staff, has been to anticipate these changes or, failing to anticipate them, at least to note them when they have arrived and to bring about the appropriate changes in the internal structure of the environment of the hospital to meet them.

THE PROCESSES OF INNOVATION

How does the executive of any organization discharge his responsibility for providing appropriate innovation, appropriate adaptation, to change? He does it in a variety of ways. He does it partly by his personal activities as an innovator, by being creative and innovative himself. And he does it because he is an executive and because he has at his disposal organizational resources; he does it by giving attention to the organization around him and the way in which that organization can be sensitized to change and can itself become a major factor in producing the innovation.

To do these things effectively, that is, either to be effective himself in decision-making about the problems of innovation or to produce an

organization that can have this kind of effectiveness and that can adapt itself to the changing needs around it, the executive needs to know something about the processes that are involved in innovation, and in creative problem-solving, in dealing with problems that are novel and that cannot be dealt with by the habits of the past.

In one sense, we know very little about what goes into creative problem-solving. A lot has been written and said about this process; there's considerable mythology built up around it. This is the mythology that is invoked with the mental picture of the great composer or the great painter or the great surgeon, whoever it may be, sitting with his head in hand reflectively until he has a stroke of inspiration, and then suddenly producing in a creative onrush of his talents.

WHERE THE DIFFERENCE LIES

We all harbor such stereotyped pictures of the innovative process, and, admittedly, some of them are true. We have all known individuals of varying degrees of creativity, and we have observed some of the earmarks of creativity and innovativeness; we have learned to distinguish people who are capable of this sort of activity from people who find inspiration in a more conventional manner.

What is it that distinguishes the decision-making and problem-solving processes that an individual goes through? What is different about the way he approaches a problem of a non-routine kind and the processes he experiences when he is dealing with a problem of the sort that he encounters every day or every week?

Perhaps the most important difference is that in ordinary decision-making the principal task is to look at the situation and to decide which of a well-known list of possible actions from the repertoire of actions that are available is the appropriate one for this situation. Such action is comparable to the medical man's action: "diagnose and treat." The doctor customarily looks at the patient, recognizes the symptoms, and draws from his experience—and perhaps out of his medical library—the appropriate action to cure the particular disorder. All of us daily experience many of these cycles of diagnosis and application of well-tested remedies.

In the case of novel problems, however, perhaps the largest part of the decision-making process consists in constructing and reviewing alternatives. In such situations the problem is not necessarily deciding whether to do this, that, or the other thing—where these choices are well-known alternatives—but, rather, in deciding what to do when it is not at all obvious after critical examination that anything can be done, or, if it can, just what it might be.

An important facet of this kind of decision-making and problem-solving is the need to construct, almost out of whole cloth, courses of action, programs, and responses that were not in the administrative hamper at the beginning of the process.

If we examine the kind of mental activities that are involved in this type of activity, we would find that they are quite different from the processes and activities in the more repetitive or automatic situations. In some respects, they are more primitive activities. There is much more room for trial and error, for search, in the novel problem-solving situation than there is in the routine situation.

ANOTHER APPROACH REQUIRED

In the routine situation the man who is skilled and experienced usually has the answer close at hand. He does not have to stumble around looking for it.

In the novel situation, however, one of the important elements that may be required for a solution is the kind of patience that is willing to look at large numbers of possible long-shot tentative solutions to the problem, without losing courage and without getting restless.

I suggest trial and error as one of the techniques. But obviously people who are effectively creative do not simply explore words in the dictionary until they find the ones they want, at least not alphabetically. They have some idea where to look in the first place.

What seems to be involved here is a search that tolerates much more trial and error, that permits many more longshots than the repetitive decision-making process. In this search the individual draws on all the "ques" and "flews" he can muster, in order to cut down the amount of chaff that he has to go through to find a little bit of wheat. That is

perhaps as close as I can come to a very global description of the psychological processes that are involved in innovative problem-solving.

There are many terms that we use to describe this process. Why? I suppose that they are terms that denote our respect for the process and for the people who can employ it. The terms also suggest its basic mystery for us: the difficulty in understanding how an individual, by selectively searching through books, people, or his own mind, can come up with ideas and conclusions which were not at all obviously present in the original situation.

WHAT IS JUDGMENT?

As a result we have quite a vocabulary, not to describe this process, but to name it and, as I said, perhaps pay respect to it. We say that people doing this "exercise judgment."

What is judgment? Well, it is anything about the thought process that neither you nor the man who is exercising it quite understands. He reaches a decision and feels satisfied about it; he believes he has made the right decision, and often it turns out that it was. But he cannot really tell in detail what processes he went through to reach it.

When we see examples of judgment that are particularly impressive and somewhat mysterious, we are inclined to call them "wisdom." But I have not seen any description of the processes involved which distinguish judgment from wisdom. It has been suggested that wisdom encompasses a greater degree of breadth in the considerations that were brought to bear on the problem than judgment. But that is about all that has been reported by way of distinguishing the processes.

REPETITIVE DECISIONS

During the last fifteen years there have been many innovations in management; considerable progress has been made in understanding the processes of management, but we have made most of this progress at the level of the face-to-face group, the first line supervisor, and the repetitive day-to-day decisions and activities of management.

Important work, as you know, has been done on the role of the super-

visor and has provided insight and understanding of the relationships between a supervisor and the persons he supervises—some grasp of the motivations that are involved and some idea of the reactions to the exercise of authority. From this research has emerged many sound suggestions leading to the improvement of supervisory practices, the better conduct of small face-to-face groups in the work of administration or in discussions and conferences, and the more effective use of individual motivations in securing productivity in an organization.

We have learned how to use mathematics to prepare procedures and rules for scheduling inventory and production in a factory. And there are a great many factories and departments in factories where important decisions are measured by the amount of productivity and the number of people and the dollars involved. These are vitally important decisions, but, nonetheless, they are the repetitive type and can be made with the aid of mathematical decision rules.

A RASH PROGNOSTICATION

What I think is most likely to happen in the next twenty years is that the same kind of development is going to occur at the level of managerial decision-making—at the level of the innovative decision-making—and that the processes of judgment are going to be more and more guided by a more profound knowledge which we will acquire of the workings of the human mind and of the way it actually goes about solving problems in situations which call for creativity, for judgment, and for wisdom.

That sounds like a rash prognostication, I know. In any area of science there are some mysteries that we think more unfathomable than others. In the physical sciences we are examining smaller and smaller objects; and, at the same time, we are exploring farther and farther into the galaxy. However, "sputniks" are traveling in an area of space that has been known for a very long time. There is nothing very mysterious about such flight; the problem has been basically how to get out there. As we penetrate these outer reaches, we somehow feel as human beings that there should be mysteries here and that it should become more and more difficult to explain things as we get farther away

from the common everyday areas of human experience.

In the biological sciences, I think, we tend to center those mysteries in the nature of life itself. And some of the most exciting, and at the same time most inexplicable, biological research that is being conducted today is the exploration of the nature of the simplest organisms and the way in which living organisms are related to the underlying organic materials, the proteins and other materials, of which they are composed.

Similarly, in the area of human behavior we are perfectly willing to believe it possible to understand the musculature of a human being as a piece of mechanics or biomechanics, to understand some of the simplest reactions of a human organism to its environment, and to make generalizations and do laboratory studies about things like conditioned eyelid reflexes. But as we begin to approach the core of activities which we think of as peculiarly human—the higher mental functions and the higher emotional functions—it becomes more and more mysterious to to us how to explain any of these activities, how to understand the underlying processes and mechanisms that are involved.

EXPLORING FUNCTIONS OF DECISION-MAKING

The practical question for the scientist is deciding what directions to pursue his fundamental research. The practical question for the user of science is whether we can understand these things better than we understand them today—not the issue of whether there is an ultimate mystery we cannot solve. The question is whether some of the mysteries that we now do not understand are unnecessary mysteries. Need we be baffled about what causes human beings to behave the way they do in a particular supervisory situation? Need we be baffled about what it is a person does when he deals with a difficult problem?

The practical question is: Can we push forward to a deeper understanding of the functions a human being performs when doing difficult problem-solving tasks? We have already advanced toward a deeper understanding of human motivation and human attitudes as they are exhibited in the work place and in social relations with other humans.

Before I establish my belief that we are, in fact, going to make very important progress in this direction very soon, let me explain the impli-

cation of this research to the practice of management and particularly to the job of the manager himself.

In saying this, I am assuming that the basic role of the manager remains the same: the task of adapting the organization to changing circumstances. I do not anticipate the replacement of executives by machines. This may happen. I hope that before it does, however, we have time to contemplate it, to decide how well we like it, and to consider how we are going to adapt to it.

My point is that we are going to understand ourselves better as executives and be able to perform our tasks as executives more effectively than we now do by using that understanding to enhance our effectiveness.

The executive's role, as I see it, will continue to be an individual, an innovative and creative person, an expert in the design of organization who can adapt to his environment. The executive will be able to look at his organization and ask such questions as: Where are the changes taking place in our society? How will these changes affect this organization?

THREE PERTINENT QUESTIONS

The administrator of each organization or institution has to answer these questions for himself. I would not undertake to answer them for a hospital. I can make some conjectures, however. I can point to some obvious things of which you are all aware. Certainly, one of the important sources of innovation for the hospital is in the biological sciences and in the medical schools which change the nature of medical practice.

Other sources of change that affect hospitals are the state of the general economy, the nature of economic and social institutions, the ways in which medical care is financed, and the responsibility the family assumes for medical care.

The executive's responsibility, it seems to me, is to ask these three pertinent questions:

1. Where in my organization do I have listening posts? Where do I have the radar antennae to pick up information of impending changes, impacts, or prospective impacts on my organization?

In organizing my hospital have I considered communication and its

relation to myself and my associates at the meetings we attend, in what we read, in our luncheon guests. Have we given adequate attention to providing throughout our organization the sorts of listening posts that are needed if we are to learn about environmental changes and be prepared to adapt to them?

2. Where in our organization do we have the people—and the allotted time—to do problem-solving thinking, the innovative thinking that will assist us in adapting to the changes that may appear on the horizon? What have we done in our organization to allow irrevocable change to take place in an orderly and systematic way rather than by happenstance or as an emergency when the situation is altered so radically that something has to be done at once?

"LAW OF ADMINISTRATION"

I think that, in this particular area, there is a sort of Gresham's "Law of Administration" in which I believe. It is modeled after Gresham's "Law of Economics," which states that bad money drives out good. Gresham's "Law of Administration" says: "Day-to-day detail drives out planning and thought for the future." Unless we consciously act in our organization to designate people and grant adequate time to contemplate long-range problems, there is a risk that these vital areas will not be considered until they arise as emergencies.

Here, again, this long-range thinking is partly the task of the executive. But it is also his responsibility as head of the organization to administer it in a way that will provide these kinds of assistance.

3. Assuming that we have efficient intelligence facilities, that we have time and people allocated to think about future problems as well as about present problems, the third thing that the executive needs in his organization is people—or organization units if it is a large institution—who have the abilities for innovative problem-solving, who have the creativity, judgment, and wisdom, to respond to new challenges as they arise. The emphasis here is on the assessment of people.

In looking about your organization, you want to be sure not only that it is adequately staffed with moral, conscientious, and skilled people who can do the day-to-day tasks but that it has a place for and is even

tolerant of a sufficient quota of idea men to participate in the more innovative parts of the planning task.

I would like to emphasize that phrase "tolerant of," because at least one of the stereotypes many of us harbor—and it may have some validity—is that an "idea man" is a fellow who is always spouting off new suggestions. "Why don't we do it this way? The way we're doing it now is wrong." Such people can be a terrible nuisance in an organization if any value at all is placed on "peace and quiet." Enough of my life has been devoted to dreaming, as distinguished from professing, that, like most administrators, I also place a high value on peace and quiet.

Periodically, even in the permissive atmosphere of an academic environment, I have to ask myself about a particular colleague, "Is he obstreperous? Or is it something more? Are his contributions to the organization in new ideas so valuable that we should make room for him in this structure—room that frees him from the danger of being enmeshed in the day-to-day business of our regular work?"

PROBLEM-SOLVING COMPUTER

At this point I want to elaborate on an earlier and seemingly rash claim—that we are soon going to have developed scientific knowledge of the executive process itself, that is, an understanding of what goes on in the human mind when it is doing difficult problem-solving and creative thinking.

The modern digital computer is providing us with a great deal of the information that has been gathered in this field.

If you have had only casual contact with computers, you may think of them as devices for doing arithmetic faster, more patiently, and with fewer errors than can be done mentally or manually. And this, of course, was the reason computers were designed and built.

Their potential, however, is much more general. A modern digital computer is capable in an extremely general way of handling symbolic information.

I use the term "symbolic information" and not numbers because, although we think of the computer as dealing with numbers, the computer really does not comprehend numbers as such. All it "knows" is

that it is comprised of some magnetic charges, some electrostatic charges, or some holes punched in a tape. As far as it knows, these might just as well be letters, Egyptian hieroglyphics, or most anything. A computer, then, is a device for handling symbolized information. At the present time this is usually interpreted as numbers, but it need not be. It might conceivably be interpreted as English words, or French words, or Russian words.

Now a computer is capable of interpreting one thing if it finds certain information, and another if it finds different information. For example, in arithmetical calculations this device is used to allow the computer to examine its own calculations; to decide when it has a sufficiently good approximation, and then to stop. But the computer can be used in much more subtle ways than this. As a matter of fact, in principle at least, the computer can make the same kind of differentiation between one English sentence and another as we can and can interpret in a variety of ways, depending on which sentence it is reviewing.

SIMULATING THE MIND AT WORK

Vigorous research is currently under way at a number of scientific centers in this country to use computers not directly to accelerate the business by computing numbers, solving equations, or preparing the payroll—as they are very usefully doing in many organizations today—but rather to simulate the information processes that go on in the human mind. In such a situation the computer is not utilized in much the same way as a human being tackling a problem. Undoubtedly, the computer will make many mistakes and probably will be stupid in the same ways we are when dealing with complex problems.

A few years ago the use of a computing device in this manner would have sounded "Buck Rogerish." Today, we are all much more sophisticated. Let me explain briefly what is being done in this exciting area.

Most of us are familiar with high-school geometry. In this course, we were given a problem and the textbook stated a theorem: for example, if two triangles have something or other equal, prove that the other two triangles are equal.

In resolving this problem, we would study it, maybe page through

the book and see if we could get any ideas. If we were an exceptional student we had some ideas already; after some concentration we probably made a few computations trying various approaches to the solution. Step by step we approached a conclusion. Finally, we arrived at a solution to the problem; we proved the theorem.

Now these were simple problems, however, because we possibly were a high-school sophomore at the time; it didn't seem too simple to us. These problems did embody many of the elements—perhaps most of them—that are involved in any kind of difficult human problem-solving.

To be sure, geometry problems are somewhat more precise, somewhat better defined, than the problems we meet in everyday life; answers to them, nonetheless, are not a routine process. It is not a matter of turning a crank. If we solved some especially difficult ones, I think we have all felt in some small way that we had exercised a bit of creativity.

THE "EDUCATED" COMPUTER

There are today digital computers in operation discovering proofs for mathematical theorems of the same degree of difficulty and complexity as those geometry problems that we grappled with in high school.

There does not happen to be a computer today "educated" in geometry. This is a historical accident; for a variety of reasons the research teams developing computers became interested in problems in the areas of mathematics and symbolic logic and concentrated their work in these fields. These problems have the flavor of those remembered from high-school geometry; the processes are substantially the same. No doubt there will be a computer doing geometry within a couple of years; there are several research groups working on this now.

The computer itself is not doing anything very spectacular, judged by adult human standards; the particular unit I have in mind has succeeded in proving most of the theorems in chapter two of *Principia mathematica*, the great classic of symbolic logic; in fact, it has proved a little over 70 per cent of the theorems which would certainly qualify it for a passing grade in the course.

In one case it provided considerably more elegant proof than the one that Whitehead and Russell discovered fifty years ago. In most cases, it tended to find proofs very similar to those that were already known and discovered by mathematicians.

I think the significance of this and similar developments is that, before we can induce a computer to do this work, we must have some reasonably good theory about the processes that will enable it to be done. The very fact that it is possible to prepare a program toward this end indicates a considerable understanding of the underlying processes. The existence of such computer programs is a very real measure of the progress now being made in understanding complex thought processes.

You might say, quite reasonably, "Well it's all very well for computers to solve problems, but what evidence do we have that they are actually using the same basic symbol manipulating processes that are used by human beings in solving these problems?"

REPORT "THOUGHT" PROCESSES

We have two kinds of evidence to date of this: one rather general; and one rather specific. The rather general evidence is that a computer with a little additional programing can be persuaded to print and report not only the final answers, not only the final proof that it arrives at, *but as many of the intermediate steps as are desired*. Usually we do not want too many because a computer will print a roll of paper twenty feet long in ten seconds, and such a report taxes the research staff just to read it. As a result, the computer normally turns out an abbreviated account of what it is doing, just the highlights of the process: the main problems and, possibly, the subproblems.

If you analyze these reports with accounts in the psychological literature of what takes place during human problem-solving, you find that there is a very close family resemblance between the two sets of processes.

We have gathered from students in the laboratory detailed tape-recorded reports of their thoughts when they were solving problems of the type I have been describing. And we have written a computer program which attempts, and I think successfully, to simulate in con-

siderable detail the mental processes of a single human being during a ten-minute interval as he works on a particular problem.

By "simulate in detail" I mean that we have had the computer print substantially the same comments about what it is doing as a human subject in the laboratory verbalizes about the processes he is employing in solving a problem.

Another thing that has been accomplished in such research is that at least the first steps have been taken to write machine programs which not only permit the machine to solve the problem but allow the machine to learn and to increase its effectiveness from one problem to another.

For example—to return for analogy to our school days—after we had successfully solved our geometry problem, one of the things we should have done was to have learned the theorem we just proved in case it might be helpful in proving another theorem.

SOLVING HUMAN RELATIONS PROBLEMS

Another thing we might have done would be to look back at the structure of the proof and see whether it taught us anything new about characteristic proof methods, again for use in solving subsequent problems.

It has been possible to program a computer not only to solve problems in mathematics but also to remember the problems it has solved and to use them in solving subsequent problems. The device has also been programed to look at the methods that are used in solving a particular problem and to try them later for their possible value in solving other problems.

The research I have been describing certainly has relevance to substantial areas of human problem-solving. It has relevance to those areas where the problems can be stated in reasonably precise symbolic form. How much relevance it has to the much vaguer and ill-defined problems that we encounter in the day-to-day work of administration still remains to be seen.

Within the next year or two there will be several serious attempts to simulate on a computer human behavior in a discussion group. We will give the computer a human relations problem such as: "What shall

Colonel Allen do about the problems in his secretarial staff?"

For such problems the computer will be divided internally into five separate persons, or little computers; the computer will be required to carry on a discussion of the human relations problem and to conduct it in something at least resembling the English language. We may not require it to learn all the English grammar at first; we may allow it to converse in a kind of pigeon English because it does not seem useful at the outset to worry about teaching grammar to computers.

TOWARD BETTER UNDERSTANDING

Research of this type is in the future. I think you can see, however, that when we can begin seriously to talk about simulating this kind of human behavior with a computer, then we can talk seriously about understanding the human processes that are involved, not only in the problem-solving that takes place in the sciences or in mathematics, but also the problem-solving that takes place in our everyday work in organizations. Obviously, as this research progresses it is going to have a major impact on the practice of management. As we know ourselves better, as we know what goes on when the mysterious process of judgment is taking place, we will be able to train that process to a higher degree of proficiency.

In the Introduction to the new edition of my book *Administrative Behavior* I said that I did not feel it necessary to revive in 1957 very many of the words that I had written down in 1947. And I said that I thought that, in another ten years, that book would sound a little bit old-fashioned.

Perhaps that is one of the reasons I had some reservations at this particular juncture to completely revise the text. I think that ten years from now someone will be able to write a book for administrators that will help them understand at a much deeper and more profound level than this book does the processes that they and their colleagues use in their work and which will help them in their own behavior and in the design of the organizations for which they are responsible to carry out more effectively than they are now able to do the important human and public services with which they are charged.

A review of some of the accomplishments of a new technique for studying man and machines to gain understanding for purposes of control and improvement

Operations Research as a Management Resource[1]

BY THOMAS E. CAYWOOD, PH.D.

OPERATIONS RESEARCH, frequently referred to as OR, was conceived for the purpose of analyzing military operations and originally was concerned with the analysis of antisubmarine and fighter-aircraft operations. More recently, Operations Research has been applied to industrial and business operations. A rather typical military OR problem currently under surveillance in this country is the determination of the best intercontinental ballistic missile defense. As in a typical OR problem, it is relatively easy to define the problem but very difficult to state in detail its nature. In this case we do not know exactly what the problem will be, since no one has a direct line to all possible enemies of this country. Moreover, even if we postulate a given enemy, we do not know how many missiles may be fired or in what manner they will be fired. We can determine, however, the possible characteristics of such missiles and try to find the best way to defeat them.

TARGET FOR TONIGHT

First, we can consider the direct defense—destruction of the missiles on their way to their targets. This may be done by sending up countermissiles after specific target ICBM's or by establishing a type of combat patrol available to intercept a missile. Then there is the possibility of an interception of an ICBM in space before re-entry into the atmosphere and possible interception after re-entry. The best way to do this will be through use of early-warning capabilities and the maneuvering capabilities of the antimissiles—neither of which

[1] Presented at a general assembly during the twenty-fifth anniversary First Congress on Administration of the American College of Hospital Administrators, Congress Hotel, Chicago, February 11, 1958.

has been developed as yet. Finally, even if one is able to find the best way to destroy a missile on the way to its target, it is just possible that the best way to solve the problem may be to destroy the ICBM bases before the missiles are launched; or it may be better to have such a large retaliatory force that the possible enemy would fear to launch an attack. The problem of picking the best ICBM defense can be quite complicated. It involves a number of factors that cannot be completely predicted and also the analysis of equipment not yet developed. This problem is one of the most significant being worked on by military OR groups at this time and is a fairly typical OR problem of the highly complex type.

OPERATIONS RESEARCH DEFINED

Operations Research may be thought of as research of operations. "Research" normally means an exhaustive investigation of something in order to understand how it works and how it can be controlled or improved. "Operation" refers to any phenomenon or system which serves some function or purpose. Typically, operations of interest contain both men and machines and some directory or supervisory element. The running of a machine shop is an operation, and so is the functioning of a railroad freight yard. Operations Research, therefore, is the study of complex man and/or machine phenomenon to gain understanding for purposes of control and improvement.

OR's initial development began in the United Kingdom during World War II and was quickly introduced in the United States. Its origins were military in context, but after the war OR moved into business, industry, and civil government. The OR movement was rather gradual in the United States until 1951, when industrial OR took hold; since then it has developed very rapidly in this country.

The initial practitioners of OR were physicists, mathematicians, chemists, engineers, and scientists in related fields. These men were employed by the military to assist in the solution of the many complex military problems that existed during the war years. With the end of the war, economists, psychologists, and statisticians joined the ranks of OR practitioners and began working on the problems present

in business, industry, and civil government. The common denominator among these scientists was the belief that mathematical and specialized techniques of their respective fields could be useful in the solution of the complex man and/or machine problems which daily face managers of commercial and industrial activities.

The unique feature of OR activity is that it pinpoints the various parts of a problematic situation and is concerned basically with the interrelationship among these various parts. Studying the system as a whole not only guarantees that a solution will be operationally feasible but also points out the true dependencies of each factor upon the others.

THE LANGUAGE OF MATH

OR studies invariably require the use of mathematics as a language. Mathematics enable the abstraction of observations and relationship into relatively brief and precise forms. The aggregation of forms into one system corresponds to the creation of a mathematical model. The mathematical model is a symbolic representation of the problem being investigated. The purpose of having this mathematical model is to facilitate the manipulation of relationships and to predict what should happen under circumstances that had not previously been observed. The basic use of the model is to find by systematic manipulations the values of each of the factors in the model which provide the best solution to the problem. Being able to arrive at the best solution in a short period of time through the manipulation of mathematical formulas is usually better than the lengthy application of trial-and-error techniques to obtain stepwise improvements to the problematic situation.

What are some of the areas of industrial activity to which OR has made a substantial contribution? One such area is characterized by the desirability of incorporating probability calculations into the determination of business decisions. Just as in the case of the military operations, in many situations it is impossible to predict the daily extent to which supplies will be required by a company. For instance, if the demand for a product is subject to the vagaries of customers' wishes, there is a problem to determine how much inventory of the

raw materials and the component portions as well as the finished product should be kept on hand. Although it is virtually impossible to predict the daily demand of the finished product in such a situation, it is nearly always possible to arrive at certain statistical characteristics of this demand. By means of OR techniques it is possible to determine the optimum inventory and the various costs of each type as a function of the statistical nature of the customer's demand. In this case, gross errors are made if the demand is replaced by an average demand, and the probability that the demands will be very high or low for a series of periods must be considered. Also, if certain periodic correlations are present in the demands, one cannot use a simple average to represent the situation. In cases where demands are seemingly unpredictable, OR makes a definite contribution to inventory control.

TYPICAL OR PROBLEM

Another situation where the unpredictable nature of a customer can change the nature of business decisions arises when a company supplies service facilities. If we consider, for example, a major airline, we can enumerate some problems of this type. First, reservations. How many telephone trunk lines and telephone reservation clerks should be available in each city? How many and how large should these ticket offices be? At the airport how many check-in counters, and how many gates should be made available for aircraft to use for arrivals and departures? Upon further investigation one also finds that similar decisions must be made about the amount of maintenance facilities required at each airport and even the number of aircraft needed to supply customer demands.

The basic problem in all these illustrations is that service costs money. A company can make more facilities available to its customers only if it finds that the additional facilities will pay off in customer satisfaction. Recently, a theory was developed to handle these situations. Analytical difficulties arose, however, because of the fact that individual customer behavior is not predictable. If customers behaved according to a pattern, it would be easy to predict the usage of a given set of facilities by a given customer load. For instance, suppose that sixty

customers wish to make reservations by telephone over a period of one hour and, further, suppose that each telephone conversation lasted exactly two minutes. Then it is clear that two telephone trunk lines and two reservation clerks could handle the traffic if the customers called on a predetermined schedule.

We know, however, that customers cannot be regimented to a predetermined schedule and that telephone conversations are not completed in exactly two minutes. For instance, in a particular case where the average telephone conversation was two minutes, about 40 per cent of the calls lasted one minute or less and 5 per cent of the calls lasted over six minutes. Of course, there is always a troublemaker that takes a very long time to service. For the perfectly scheduled calls with exactly two-minute conversations, two operators could handle the assignment; no one would have to wait for service.

PERTINENT QUESTIONS

In real life however, if three operators used a greater number of trunk lines, there still would be customers waiting for service 20 per cent of the time. In fact, 2 per cent of the time there will be over six customers waiting for service while the three operators are working. In fact, 2 per cent of the time customers would have to wait longer than six minutes for service! Would you wait six minutes for a plane reservation? Or would you try a competitive airline? The analysis of operations of this type is aided by a recently developed queueing theory or waiting-line theory. On the basis of this theory and its applications, one can predict the availability of customer service that one can expect from various service arrangements. This, in turn, will determine the selection of the required facilities.

Of course, operating decisions could be determined experimentally, but this technique of solution might be quite expensive. In one case, analysis of the truck-dock requirements of a department-store warehouse showed that, if one tried a seemingly reasonable number of docks, 20 per cent of the time there would be a line of trucks two blocks long waiting for service. This line would block two intersections and two public alleys, with obvious repercussions from the city's

traffic departments. In general, it is more satisfactory to predict the outcome of certain operations without actually trying them, then trying those that seem successful.

THOSE PUZZLING VARIABLES

Another type of operation that OR has successfully handled is one in which a large number of variables or possible cases must be considered. In these cases, a systematic technique of treating various possibilities is organized. Consider, for example, the problem of a diet. It is known nutritionally that foods may be widely substituted in a diet as long as certain dietary elements are maintained. For commercial purposes a company may seek an adequate diet at the least possible cost. In a practical case of feeding growing chickens, thirty-five or more foods or commodities are available. In addition, there may be twenty-five dietary elements such as protein, fat, calcium, phosphorus, etc., which constitute minimum daily requirements for a growing chicken. A company manufacturing chicken feed naturally is interested in the prices of the commodities. As they vary, the manufacturer might wish to change those used in the mixture. Since, in general, each commodity contains a different amount of each dietary element, the substitution of commodities is no simple matter. There are many mixtures which will maintain the dietary minimums, but it is practically impossible to find the least expensive ones by trial and error. For instance, in one particular thirty-five-food, twenty-five-element case, more than one billion different mixtures would fulfil the requirements. A technique called "linear programing" has been developed to handle cases such as this. For simple problems the technique can be worked out by a clerk with paper and pencil. For more complicated situations such as the diet problem, a high-speed electronic compute is necessary for a solution in a practical time. And, in fact, a major feed company is now checking and selecting its feed mixtures by this technique.

This diet problem is comparable to the one the housewife faces when she goes to the grocery store determined to get the most for her money. The diet requirements for a human being have been developed

utilizing seventy-seven different foods and nine principal nutrients. How much would the diet have cost each person a year? In 1939 the minimum daily requirements would cost less than $40.00. Sounds inexpensive, doesn't it? What is this low-cost diet? The optimum diet consisted principally of wheat flour, cabbage, and dried navy beans or hog liver. If that were one's diet all year long, he would save money, but life would hardly be worth living!

BIRTH OF THE "C" RATION

However, to select the best-balanced diet for paratroopers, one would wish to minimize its weight for given dietary requirements. In this case palatability would be of secondary importance, and the optimum solution might be selected. In fact, in World War II it was selected—it was called "C" rations!

The linear programing tool of OR can be used to solve many types of allocation problems. For instance, the determination of optimum routing of oil tankers from oil ports to consuming ports was extensively worked on during World War II; the routing of empty freight cars on a rail network is a companion peacetime problem; the determination of the least costly traffic patterns from a multiple-factory company to its many consumers and the best traffic pattern to serve intermediate warehouses also can be solved with this technique. Once these problems are overcome, company executives are free to consider the possible locations for new plants or warehouses and the expansion of facilities.

HOSPITAL APPLICATIONS

These are but a few of many fields in which OR has aided management. OR can assist the manager in assimilating the effects of a large number of factors and in the determination of a best policy when elements in the situation are not completely predictable.

There are some areas in the hospital which appear to me to be amenable to OR techniques. For example, the purchasing and inventory of supplies of a hospital is similar in principle to the purchasing in a manufacturing operation; these areas of inventory control and purchasing have been successfully explored by OR. Furthermore, the

maintenance of equipment and facilities in a hospital has much in common with that of industry. For instance, the optimum policy of electric-light-bulb maintenance and replacement may involve the placement of different values on the continuance of service in the two cases, but the basic analysis used in an evaluation of a replacement policy would be identical. In the case of a factory, considerable OR effort has been spend on the determination of the optimum maintenance staff. Since a factory produces the maximum amount of finished goods when every machine is working, the maintenance crew is earning the most money for the company when it is not working. If the maintenance crew is always busy, some equipment obviously is out of service. The determination of the optimum maintenance policy for hospital equipment would be a challenging OR problem.

FERTILE FIELD FOR OR

Hospital waiting-line or queueing problems seem similar to those of other service facilities and might also lend themselves to OR examination. Hospital layout and use of service facilities are other areas where OR can assist the administrator. Finally, in the design of new hospitals and new facilities, OR has application. A British report on OR in hospital planning and design points out that this technique can be applied to determine the size of a new hospital, number of beds, number of emergency beds, design of ward units, walking distance space between beds, and the effect of an early ambulation policy.

The entire outpatient system suggests waiting-line problems. The time of arrival of outpatients is similar in many ways to the arrival phenomena of airplanes at an air terminal. Patients, like planes, may be scheduled to arrive at certain hours but in actuality arrive early or late, irregularities which, in turn, affect the service that can be provided by a given set of facilities.

There are, unquestionably, a number of hospital operational problems that can be solved by OR techniques. As a guide, consider the following rule: If a decision based upon quantitative information and conflicting goals is needed (e.g., increased service, decreased costs), chances are that Operations Research can be of assistance to you.

Deliberate, planned, and preconceived action
in the administrative process maximizes
the possibilities of success
in achieving desired objectives

Strategy in Administrative Action[1]

NORMAN H. MARTIN, PH.D.

ADMINISTRATIVE action is concerned with getting things done. It is action directed toward the attainment of a goal. Such action requires not only the handling of materials and money but, even more importantly, the use of man as a means toward an end. Call it "inflammatory," call it "controversial," it happens to be a fact. And so, instead of wringing our hands over it, let us deal with it!

In order to achieve his objectives, the administrator cannot move in a random or haphazard fashion. Rather, he should proceed on the basis of a plan, or, to use my terminology, on the basis of a strategy.

Too many of us either naïvely neglect, or, what is worse, deliberately overlook, the strategic and tactical elements of the administrative process. Terms like "manipulation," "alliance," "coalition," and "maneuver" tend to jar our morality and our conscience. But this is shortsighted of us. We are involved in life "for keeps," and we cannot leave accomplishment to chance.

The activity of any executive involves successive strategic and tactical operations; it necessitates the sound calculation and co-ordination of ends and means. The end must be proportioned to the total means available. It is foolish to choose goals on any other basis than what is coldly realistic. Before embarking on a project, you must have the means to achieve the end. The means used in gaining each intermediate end must be proportioned to the values and needs of that end. There must be an economy of means—an excess may be as harmful as a deficiency.

Timing of action is also highly important and crucial. The executive seeks to attain his objectives by utilizing the most advantageous circumstances possible in order to produce the most profitable results. The

[1] Presented at the twenty-fifth anniversary of the First Congress on Administration, American College of Hospital Administrators, Congress Hotel, Chicago, February 11, 1958.

problem is to create these circumstances. This is the purpose of strategy.

Strategy has been defined as "the art of the general." It involves the clarifying and setting of objectives—both ultimate and intermediate. It involves the fitting of objectives to the means—to the possible shifting of objectives so they are more realistic. Strategy also involves establishing general principles of action to guide the sequence of moves toward objectives, guides which enable an executive to gain his goals with an economy of effort. It serves the function of enabling the administrator to be in the advantageous position of being "strong at the decisive point."

Tactics, on the other hand, refers to the art of executing the moves necessary to carry out the elements of strategy. Tactics involves the technical handling of each strategic move. When an executive seeks to expand existing facilities, increase his budget, handle an interdepartmental squabble, even maintain harmony in his home, the careful formation of strategies and the development of tactical moves to execute them are highly important.

THE ELEMENTS OF STRATEGY

The notion of strategy involves several elements. It involves a plan of action for the future. It is based upon anticipations—predictions of what will happen, of how individuals will behave. It is also based upon an assessment of one's own resources and capacities (or the resources of the organization)—in total, the means one has at his disposal. And it is closely related to objectives.

A strategy or series of guide lines is formulated based upon a projected state of affairs and designed to lead to intermediate and ultimate objectives. On the basis of this strategy, the individual acts. However, it is difficult—if not impossible—to predict accurately the future. Events occur which are not anticipated. Therefore, it is necessary to revise one's strategies as the situation changes. The executive must be as ready for a new situation as a boxer, who may adopt the strategy of counterpunching an opponent's leads at the start of the match only to have to shift to an offensive leading style because his opponent refuses to lead.

Because strategy is tied in irrevocably with the emerging situation and must vary with it, it is necessary for the executive to be in possession of sufficient information for him to construct the future. For this he needs a good intelligence system. Reliable and complete information is absolutely necessary for sound strategic and tactical operations.

An intelligence system must furnish information in the following crucial areas:

1. The existing states of affairs.
2. The strategies of others. Since, after all, other executives are not merely passive objects being acted upon but are planning action, too!
3. The results of previous action; has it affected all persons involved?
4. The personality of one's self and other persons—their motives and their vulnerabilities.
5. The "strategic stature" of one's self and of others.

Obtaining such information requires both observation and research operations. It involves putting one's contemporary world under close and systematic observation. Further, it necessitates making meaningful interpretation of what was observed.

Many avenues or sources of intelligence are available in any organization. Here are some of them:

1. *The apprehending and analysis of information coming through formal channels.* This channel, incidentally, is too often ignored.

2. *The knowledge and utilization of the "grapevine."* Grapevine is a misnomer for this source, actually, for it is not like a vine with a central stem and numerous branches and vines. Rather it is a series of closed circles—cliques of individuals circulating information—comprising one or several common members. It is imperative that an executive know the composition of these information cliques. He must know where to get information, where the source of information is, and how to feed information to the vine.

3. *Information on personalities.* This involves close and systematic observation of key individuals, gaining insight into their attitudes and motives, their behavior patterns, their vulnerabilities, their defense reactions, and their values and standards of conduct. It also means knowing their intentions—their possible responses. It requires ascertaining the influences they can exert, their relationships with associates, their

personal friends, and their frailties. All this knowledge is necessary in order to predict with some accuracy what they may or will do in a given situation.

4. *The exploratory move.* Many times it is necessary to find out information about one's own position, power, and the possible success of a projected move. One way of doing this is to perform some relatively unimportant act and observe how others respond to it. This "trial balloon," or "dry-run" activity can prove most enlightening.

5. *Buffering a proposed action.* A common method of getting information on a projected move is to "buffer" the contemplated action with key personnel. This entails obtaining reactions, opinions, and sometimes commitments of support from them. The number of possible techniques for obtaining vital information is limitless. However, these indicate the range.

Information, however, is meaningless unless it is organized to reveal the *pattern* it suggests. Pinpointing this pattern falls within the province of research operation.

First, information must be assessed and evaluated. There is always danger of misinterpreting or of giving too much weight to a given action—of attaching too much importance to it. Of all information, we must ask: (1) Is it true? (2) What does it tell us? (3) How does it compare with other information? Is it consistent with what we already know?

Next, we must relate isolated information to what we already know about a situation. Normally, we make judgments—approximations—about existing situations. As we gain further information, however, and, as the pattern emerges and changes, we must always requalify what is, even at best, a problematic situation. Our inferences serve to guide further observation and further verification.

On the basis of changing conceptions of the situation, strategies may have to be revised. Here we may introduce an additional suggestion. *The executive must determine what factors are open to intervention and change through his efforts and which are not.* These determinations become parts of his over-all strategy.

Let me introduce some typical strategies. They are not intended as universal truths but only as illustrations taken from actual situations.

One vice-president of a company says, "You must plan, but only when you have information. Be ready to admit when you don't know and plan a situation so that you can move fast in any direction."

Another executive points out: "When you have a factor that you can't control, seek to diminish the value of that factor."

A plant manager offers this fundamental strategy: "I never like to put anything in writing. It sets a policy."

The choices of specific moves or actions are guided by such strategies. Not only the selection of action but also its sequential ordering in time are based upon the evolution of general lines of strategy by the executive.

As one sales officer indicated: "In order to operate in unstructured situations, you must develop—either explicitly or implicitly—a philosophy or strategy to enable you to act quickly."

THE IMPORTANCE OF TACTICS

Strategies, however, are of little use unless they lead to action. This brings us into the area of tactics—the execution of moves necessary to carry out the elements of strategy. Unless the executive can perform, can carry out, can make the necessary moves, unless he can negotiate the roles called for in specific situations, he will fail in accomplishing his objectives. For example, a man may know that he should make a move to ask for a raise but be unable to *do* so when he gets into the boss's office!

Tactical operations call for the most careful planning and rehearsal. Technical resources must be assembled, social contacts made, and support marshaled. The results of one action must be assessed and preparations made for the next forward steps.

Take, for instance, the tactical operation of conducting a meeting, a meeting that is being held as part of an executive's general strategy. A particular role is required—a role determined by the strategy of the executive—which is based upon his knowledge of the characteristics of the group and what he has learned about all the members. The executive must be able to negotiate that role. One way he may do this is by intuition, that is, spontaneously. But the chances are that, while he may be

able to do this once or twice, or on occasion, in most instances this technique will fail.

Conducting a meeting called for the express purpose of gaining a specific objective—for example, to win agreement on a new method of cost reporting—requires, among other things, communicating a certain point of view. The task of the executive is to convince, persuade, arouse emotions, to alter behavior in the direction he desires.

In order to do this, he must analyze his audience—the men who will sit in on the meeting. He must plan the sequence of arguments he will introduce. He must pick the roles he will play, based upon his anticipation of how the group will respond to his recommendations and suggestions.

DEMANDS PRECONCEIVED ACTION

For this type of action, he must rehearse. He must substitute deliberate, planned, and preconceived action for spontaneous, catch-as-catch-can behavior. He must move from the *un*known and *un*controllable world of chance to the known and controllable world of deliberate, *pre*conceived action.

If the executive does this, narrowing the field of chance, he will maximize his chances of success. For the average individual goes to meetings with a relatively blank mind—unprepared, unrehearsed. The executive who plans and is prepared will be able to achieve the initiative by attaining the element of surprise, so crucial to success.

This ability to manipulate groups is often thought of as being a matter of genius. However, a great deal of what passes as "natural" ability is, in fact, the result of the conscious and deliberate development of skills.

SUMMARY

Strategies must be constructed on the basis of predicted situations. They must be revised to meet change. The executive must always be in touch with the emerging course of events. Absolutely vital to his success is the development of a sound intelligence system, the means whereby the administrator can get information and establish patterns. Only in this way can actions or moves be properly selected, timed, and rendered consistent with one another.

From the tactical standpoint, there must be careful preparation, planning, and rehearsal. Skills necessary to carry out preconceived action must be developed.

An administrator is in a serious game, one in which he cannot afford many mistakes. On this point I would like to quote a pertinent passage from Walter Pitkin's book, *A Short Introduction to the History of Human Stupidity*. It dramatically illustrates a point I should like to make in closing:

> The colossal destructivity of a single blunder in an otherwise well ordered life . . . here is life's deepest, most inclusive tragedy. . . .
>
> A man may be blessed with all the splendid, admirable useful traits and, for all that, come to grief through overeating at one dinner, drinking one cocktail too many in the company of the wrong lady, forgetting a single engagement, being late at a critical conference. . . . If living were a matter of averages, how little we would have to worry over stupidities. If a man's success, his character, and his influence were shaped not from instant to instant for life or for death, but through some summation of qualities and merits, after the manner of a cosmic accountant, then nobody would ever go bankrupt. . . .
>
> Hide the fact as we may, truth is that each and every least episode in a man's career is the matter of life or death. . . . One misstep suffices to pitch the shrewdest and the strongest into abyss.

I Wish *I'd* Said That!

Reprints of this article and other articles published in *HOSPITAL ADMINISTRATION*, the Quarterly Journal of the College, are available at cost.

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BOOK REVIEWS

Human Problems of a State Mental Hospital. By Ivan Belknap. New York: Blakiston Division, McGraw-Hill Book Co., 1956. xvi+277 pp. $5.50.

The twin demons of understaffing and overcrowding, their presence demanding extreme preoccupation with problems of custodial care and hospital maintenance, leer at the reader from every page of this report of a three-year study of the social organization of a southern state mental hospital. While those twin demons seem to caution against unquestioning acceptance of certain of the author's conclusions, all persons concerned with state mental hospital operation will be challenged by this provocative report.

Ivan Belknap, associate professor of sociology at the University of Texas, reports on a three-year study of an unidentified southern state mental hospital. The study had as its hospital focus "unobtrusive and systematic observations of the day-by-day work and interpersonal relations of attendants, nurses, social workers, psychologists, physicians and patients" to obtain "a reasonably accurate picture" of the hospital's social organization. The picture which emerges is of "a form of organization imposing severe limitations on the effectiveness of professionals and laymen who are attempting to work with the problem of mental health in the hospital context."

Venturing boldly into territory generally regarded as the province of the psychiatrist, this sociologist reports his findings and postulates that the social organization of the state mental hospital, product of growth on lines of legislative expedience rather than of psychiatric value, minimizes its effectiveness as a psychiatric institution. The report probes the consequent conflict and divergence between organizational theory and practice.

The legal necessity to accept patients without regard to the hospital's rated capacity or treatment resources has resulted in serious overcrowding. This overcrowding aggravates and multiplies already serious problems of attracting and retaining competent personnel. The deadly combination of understaffing and overcrowding pyramids the problems of custodial care and hospital maintenance.

As "top-level" preoccupation with these problems grows, the numerically inadequate medical staff becomes increasingly burdened with non-medical duties. A "hard core" of ward attendants exercises undue and unqualified influence in the areas of diagnosis and treatment because the ward physician's patient overload and non-medical responsibilities make him extremely dependent upon the attendants for information.

Courageously analyzing this divergence between the formal and informal organizational structures, Belknap reports that "the informal organization of the wards is maintained and transmitted in its essentials by a core of about 18 per cent of the attendants." In this he finds cause for grave concern, referring to it as "what is perhaps

the worst feature of Southern State Hospital: the least-educated, least-trained, lowest paid and generally worst-treated employees actually have the most to do with day-to-day patient treatment and symptom diagnosis."

Belknap's analysis of the stark realities of the ward system merits study by all interested in mental hospital operation. Particularly noteworthy in this connection are his recommendations for complete redefining and marked upgrading of the positions of attendant and psychiatric social worker. Without attempting to diagram the necessary step-by-step approach to its achievement, he suggests that ultimate abandonment of the present state mental hospital setting, in favor of local facilities financed jointly by the state and the community, "might be one of the greatest humanitarian reforms and the greatest financial economy ever achieved by Southern State." Pending such reform (which, in the minds of many students of the nation's gravest health problem, can be achieved only after greatly augmented efforts in the areas of public education and public relations), Belknap suggests important revisions in existing organizational structure and "two primary changes" worthy of consideration.

"The first of these changes," he states, "would be that of eliminating the conflict in the basic definition of the hospital's functions at both state and local levels of government. The basic step in this definition is that of preventing by whatever means are necessary the present use of the state mental hospital as a solution to welfare and mental deficiency problems in the local communities." Such redefinition, he believes, would sufficiently reduce hospital patient population to permit effectuation of his second change.

"The second change," he states, "requires in substance a change in the internal administrative structure of the hospital from what is termed a scalar to a parallel organization. In its essentials, this change involves running the hospital as a system of linked auxiliary services under over-all medical supervision, rather than as a simple line and staff organization, in which these services are discharged by delegation of commands to subordinates. Such a reorganization, assuming the accomplishment of the first change, should bring the form of the hospital into greater harmony with the nonauthoritarianism and insistence on individual spontaneity of modern psychiatry."

While he tends to the belief that the very nature of the institution and its organizational structure constitutes a basic impediment to an effective program of treatment and rehabilitation, Belknap does not deny the possibility that understaffing and overcrowding are the major obstacles. "It may be argued," he anticipates, "that the problems of Southern State Hospital are the result of unusually poor financing in this particular state and that if the American Psychiatric Association (patient-personnel) ratios were achieved in staffing most of the problems of the hospital would be reduced. This argument should have careful consideration."

It is not necessary to be in general agreement with Belknap's conclusions or recommendations to find both worthy of careful consideration. The author terms this "not a strictly scientific analysis, but rather an attempt to outline and describe a system of social relationships about which many

more rigorous studies need to be made."

The report may very well serve as a trail-blazer for such further exploration. It is recommended to everyone interested in public mental hospital operation.

OTTO L. BETTAG, M.D.
Springfield, Illinois

Factors in Effective Administration. By CHARLES E. SUMMER, JR. New York: Columbia University Press, 1957. 287 pp. $3.25.

The author gives the following reason for writing this book: "If we are to devote conscious attention to administrative effectiveness, we at least have to try to find out what it takes to be a good administrator." The book is a report of an extensive study made of eighty-two courses taught in twenty leading university schools of business or public administration. One hundred and seven people who had academic posts were interviewed. Many of these people have done a significant amount of consultation or research work, and several had at one time held major executive positions in business. In his presentation the author undertakes to show that there are certain identifiable factors in effective administration in terms of (*a*) knowledge factors, (*b*) attitudinal factors, and (*c*) ability factors. The knowledge factors are broken down into eight subsections, the attitudinal factors into five subsections, and the ability factors into four subsections.

The purpose of the book is further stated as intending "to stress the fact that the study was undertaken primarily as something that would be of concrete use in developing administrative effectiveness in the world of practical affairs."

The field of administration as it is now conceived has developed rapidly since World War II, and the author reports that, of the eighty-two courses reviewed in his study, sixty-two have been installed since 1945 and forty-two since 1950. The author points out that this was not a curriculum study, and, although many courses such as production and marketing, for example, might contribute to the characteristics of administration, they were excluded because of the resources available for this study. Therefore, only courses in *administration in general* were included. The author states that the report represents a "pulling out and rearranging of the elements found in courses."

The varied approaches and differences in emphasis at the different universities are described by the author, and sample interviews are given in the appendix to elaborate on these situations. For example, at one university where the case method is used, the class discussion centers around the case material. In another university greater emphasis is given to the reaction of the students to the case material, and the students' reactions are the focus of attention.

There is an emerging field of administration, according to the author, that "includes not only a cluster of knowledge factors, but an equally or more important cluster of attitudes and abilities." Training of administrators is different from classical education because administrators are being trained for *action;* they have limited time in which to decide and act.

The author has done a thorough job of searching out the factors in effective

administration, and this book should be of interest to all teachers of administration, including course directors of programs in hospital administration. It represents an important contribution to the field of management or administration. Reading this book has enabled me to gain a greater appreciation of the program of the American College of Hospital Administrators, which, through conferences, administrative clinics, seminars, and institutes, has helped practicing administrators become aware of the newer concepts in administration.

ARKELL B. COOK

Grand Rapids, Michigan

Management in Action. By LAWRENCE A. APPLEY. New York: American Management Association, 1956. 382 pp. $5.00.

Lawrence A. Appley is one of the best-known authorities in America on the subject of management. *Management in Action* contains what he considers the aggregate of top-management thinking in the United States. It is presented in two parts.

Part I consists of seventy-eight of the author's articles which originally appeared in various publications and periodicals of the American Management Association. These articles, three to four pages in length and popularly titled, are on such topics as "Basic Attitudes toward People," "Thoughtful Management," "No Mistake, No Progress," "The Heart of Public Relations," "The Executive Job Plus," "Management Responsibility for Decision," "The Dynamics of Management," "Dandelions in the Organization," "Management Refueling," "Wrapped in Cellophane," "The Essence of Profit," "Divided They Stand," "Acres of Managers," and "Changing Incentives for Executives," to name but a few.

All the seventy-eight articles are fittingly brought together in chapters under eleven headings: "The Spirit of an Organization," "The Character of an Organization," "The Effective Leader," "The Valley of Decision," "The Management of Men," "A Personal Philosophy of Management," "Management and Communications," "The Profit Motive," "Tools and Techniques of Management," "The Making of a Manager," and "The Way Ahead." They all appeared initially in a series entitled "The President's Scratch Pad."

Appley emphasizes "thoughtful management." He suggests that the term "scientific management" does not include enough—that effective management calls for much more. He urges managers to give "more careful thought" to their administrative problems and outlines some of the fundamental areas to which it should be applied. These include (1) the basic purpose and goal of the organization; (2) managerial ethics governing the company's public relations program; (3) the major departments and divisions of the business and their long- and short-range objectives; (4) the plan of organization and individual responsibility in the organization; (5) the adequacy of all resources; (6) the standards of management performance; and (7) effective communications. All these subjects emphasize the "art of getting things done through people."

Part II of Appley's book consists of six chapters with the following titles: "Management the Simple Way," "A Cur-

rent Appraisal of the Quality of Management," "Professional Management: Its Meaning and Its Future," "Basic Factors in Organization Development," "Essentials of a Management Personnel Policy," and "Personnel Administration at Mid-Century." In all these subjects the author most convincingly presents his views on management. "Professional management," the author states, "is the application of scientific methods to operating problems."

In the author's experience, scientific management today is where the medical profession was at the time it recognized that experience in a doctor's office without formal training was not sufficient preparation for an individual to be a doctor. Just as the young man applying to study medicine today must have certain qualifications before he is exposed to training, so, the author believes, must management-training programs include a determination of the essential basic qualities. Qualifications and preparation must be brought forward in proper balance, he says. The author firmly believes that managers would be more competent today if they were carefully selected and specifically trained.

New symbols of executive efficiency are skills of management, human relations, and public speaking ability. The specialist shifting to management must relinquish some of the responsibilities of technical "know-how." "Here it is likewise important to remember that in our eagerness to push forward the frontiers of knowledge, to find new and better ways of doing things, we must not neglect to use to its fullest extent the knowledge we already have," Appley writes.

The "message" of the book is obvious: good management is the "art of getting things done through people." The theme, "Management in Action," is in evidence in every chapter. The author lists three types of managers: the custodial, who sits on top of an interested, profitable, and successful operation without making any contribution to its strength or future growth; the imitative, who waits for the other manager to make the move and then follows; and the leader, who offers courageous and creative direction and is a source of continuing strength and stability.

What is the value of this book in terms of its general contribution to the field of hospital administration? Real leadership and ability is in constant demand in the hospital field just as it is in business and industry. This informative book is a distinct contribution for consideration by those in management activity, whether they are in the top or middle echelons. The book will assist hospital administrators in analyzing their effectiveness as managers and also in finding out their own shortcomings. Small, seemingly unimportant, daily habits may be stumbling blocks to effective management. This book lucidly points up the requirements for executive leadership. It is also equally valuable to the young executive on the way up and to those already doing supervisory, administrative, or training work. It is easy to read and comprehend and is most stimulating.

Management may be thought of as an "art," the utilization of everything that may be involved in attaining an objective. There is no criteria by which its proficiency may be measured, nor is there certainty that proficiency will remain constant. Rather, the quality of management

is merely what it is deemed to be at a given time and in a given setting as compared with other accomplishments in different settings. "The 'art of management' is, in itself, too restrictive a term because there are many 'arts' required for successful administration," the author writes.

Because so many men are deeply involved in the art of management, this should be remembered: The chief concern of a great general or commander is the disposition and array of forces and the state of their morale. Once the die is cast, the future lies much in what had been wrought, and the commander is carried along by the action. However brilliant may be a commander's campaign, there is no certainty that at a later date he will be equally successful. Nor we do know that on a subsequent occasion he will not actually surpass the prior accomplishment. Those who reach a position of eminence might find that they have been on a pedestal but temporarily. Certainly, unless they are most alert, they will eventually tumble. Management first involves leadership personally exercised. Given direction, action in unison gains momentum, and statesmanship must take over from personal leadership. Successful management is indeed an "art," the reviewer believes, as well as an appalling responsibility in which an appropriate degree of humility is a distinct asset.

The book is an excellent review of the past, present, and future of management in general. Throughout its pages the author alerts readers to the many defects of management, shows how pitfalls may be avoided, and emphasizes that the field of management should be developed along professional lines. (Hospital administration training programs in their university settings are already doing much to develop professional executives in the hospital field.) While the book was written primarily for management in business and industry, hospital executives, department heads, and supervisors can profit by a careful review of the interesting articles making up this book. The author has made a significant contribution to the broad field of hospital administration.

LEIGH J. CROZIER, M.D.
Houston 25, Texas

The Hidden Persuaders. By VANCE PACKARD. New York: David McKay Co., 1957. 275 pp. $4.00.

Advertising started as a simple published statement that a product or service was available at a given address. It developed through the use of brand names, individual packaging, billboards, car cards, electric signs, color reproduction in magazines and newspapers, radio, television, and all other means of mass communication. But in recent years, with competition very keen, it was found that some expensive advertising programs did not pay off.

Some of the agencies, such as the one headed by Ernest Dichter, Ph.D., began to hire research experts to find out why people bought things. The methods of these researchers have become known as motivational research and have developed rapidly. They discovered that much purchasing is done on an impulsive basis. For example, a manufacturer of earth-moving equipment used advertisements with pictures of his shovel moving large quantities of earth. They did not produce results. When researchers were turned on the prob-

lem, they found that the purchasers of this type equipment depended on their operators for advice on which equipment to buy. The operators, furthermore, did not like the equipment, the researcher disclosed, because the pictures showed the machine, not the man controlling it. When the illustrations were changed to focus attention on the operator of the equipment, sales improved.

Another classical study cited by the author had to do with the sales of prunes. The Institute for Motivational Research, in approaching this problem, found by word-association studies that prunes had become associated with old maids, boarding houses, decrepitude, stinginess, and constipation. They recommended using brightly colored illustrations of inviting dishes to appeal to the appetites of healthy children and copy phrases such as "Put Wings on Your Feet." As a result of this campaign and redirected emphasis, the prune was given a new personality, and sales increased!

In another case, an electric refrigerator manufacturer was using pictures of his new model with the door wide open to illustrate the improvements. Sales were off. A motivational research program showed that women turned from a product which was obviously wasting power by operating with the door open. By placing a housewife in the picture and having her hold the door as if it had been momentarily opened to illustrate the improvements, the attitudes of potential customers quickly changed, and sales improved.

Motivational research has been so successful that some of the leading firms offering this specialized service now have staffs of psychiatrists, psychologists, anthropologists, and other social scientists as large as the faculty of some universities. Many of these scientists have moved on to depth studies of the subconscious mind using the psychoanalytic techniques of Freudian psychology. Advertising programs have been built on the oral impulses remaining from the sucking instinct as developed in infancy. One detailed study was made of the menstrual cycle in women in an attempt to determine when their sales resistances are lowest. Many programs are directed at the sex instinct, at the desire for beauty, security, social acceptance, and prestige.

The persuaders using the depth approach have been so successful in merchandising that they are now applying their methods to directing public opinion in other fields. Minor examples are found in fund-raising and public relations programs. A major example is the program of mass persuasion introduced by political parties. Napoleon, Hitler, and Khrushchev developed very successful programs for influencing opinion. However, they did not permit contradiction. But, even under the two-party system in the United States, the professional manipulators are at work. Many local election campaigns have been directed by advertising agencies since 1950, and in 1956 both major political parties used advertising agencies to direct the presidential campaigns.

Where will it end? The ultimate goal seems to be the complete control of human motivations and, finally, the reorganization of human society. Packard devotes a chapter to the morality of the various advertising programs based on motivational research. He summarizes the problem with the following questions:

"What is the morality of manipulating small children even before they reach the age where they are legally responsible for their actions?

"What is the morality of exploiting our deepest sexual sensitivities and yearnings for commercial purposes?

"What is the morality of appealing for our charity by playing upon our secret desires for self-enhancement?

"What is the morality of developing in the public an attitude of wastefulness toward national resources by encouraging the 'psychological obsolescence' of products already in use?

"What is the morality of subordinating truth to cheerfulness in keeping the citizen posted on the state of his nation?"

It seems to me that we are impaled on the horns of a dilemma. Either we must agree that at least some of the programs are morally wrong or we must adopt the philosophy that we have to spend more than we earn in order to keep the automated factories running at full speed: turn in that car with 90 per cent of its miles still unused, buy a slim-line refrigerator to replace an equally good one with traditional lines, tear out the white kitchen sink and replace it with a pink one. How else can we maintain full employment and keep the plants running at capacity production?

While this book is in no sense a text on hospital administration, it clearly and interestingly presents a major force in our present culture, a force with which every administrator should be familiar.

H. S. MEHRING

Philadelphia, Pennsylvania

Health and Medical Care in New York City. By COMMITTEE FOR THE SPECIAL RESEARCH PROJECT IN THE HEALTH INSURANCE PLAN OF GREATER NEW YORK. Cambridge, Mass.: Harvard University Press (for the Commonwealth Fund), 1957. 275 pp. $7.50.

Health and Medical Care in New York City, published for The Commonwealth Fund by the Harvard University Press, is a concise report of one of the more significant research programs conducted in the past decade in the area of medical care. The brief notation on the jacket of the book, "A Report by the Committee for the Special Research Project in the Health Insurance Plan of Greater New York," is at once a description of what lies within its pages as well as a statement of its purpose.

In 1950 an initial examination of the records of the then three-year-old Health Insurance Plan of Greater New York, a comprehensive prepaid medical care program known as H.I.P.,[1] seemed to indicate the existence of a veritable bonanza of valuable data which might be exploited not only for the Plan's benefit but for even broader use. The broad potential of these

[1] The following benefits are provided for persons covered under H.I.P.: general medical, specialist, surgical, and obstetrical care; laboratory procedures, diagnostic procedures; periodic health examinations, immunizations and other measures for the prevention of disease; physical therapy, radiotherapy and other therapeutic measures; professional services for the administration of blood and plasma; eye refractions; visiting nurse service at the residence of the insured person, as prescribed by a physician of the Medical Group; and ambulance service from the residence of the insured person to a hospital, when ordered by a physician of the Medical Group.

data is mentioned by Dr. Thomas Parran in his Foreword to the book:

> Although there has been a rapid increase in the number of prepaid medical care schemes in the United States during recent years, not even their administrative and economic aspects have been adequately studied. Even less is known regarding the impact of one or another of these schemes upon the health of the population coverd. As regards the elusive problem of quality of medical care practically nothing is known.

The Commonwealth Fund was sufficiently interested to appropriate funds for a conference of experts to plan a study project around this material and other relevant procurable information concerning medical care for population groups. There was developed out of this conference a comprehensive research program, well planned, adequately staffed, and financially undergirded by two great philanthropies—the Commonwealth Fund and the Rockefeller Foundation.

One of the important recommendations made at the advisory conference was that a household survey be conducted with the objective of examining two samples of households, one drawn from the rolls of H.I.P. and the other from households in the general population. A sample of five thousand H.I.P. families and another sample of five thousand other families were selected for interviewing by trained workers, using a meticulously designed questionnaire.

The general purposes of the research program which formally began on July 1, 1951, are recorded in the opening chapter of the book:

> Viewed broadly, there was need to know about H.I.P. experience for the light that it could throw, first, on the need for medical care by population groups; second, on the volume and kind of medical service utilized by persons covered by this Plan, as compared with the services sought and received by similarly circumstanced persons not so covered; and third, on the reported conditions and services rendered to categories of enrollees over periods of years, that is the so-called longitudinal studies.

The book itself, as previously stated, is a report of the findings of the first two phases of the research program and, accordingly, is presented in an orderly, objective, and scientific manner. In its physical aspects the publication is attractively bound and jacketed, printed in easily readable type, and contains a complete index and list of contents for reference purposes which facilitate its use. Tables and charts, as structured, are creditable for clarity and meaning.

There are two major divisions of the book: first, a series of chapters devoted to statistical analyses of the data studied in the project and, second, a section for numerous appendixes. The appendixes constitute a major segment of the book and contain, in addition to other important data, a storehouse of valuable information on the methodology of the study.

In the first major division, comparisons are made between H.I.P. families and the other families interviewed. Informative chapters cover such subjects as the demographic characteristics of households and their members; the insurance status of household members; persons with medical conditions; morbidity, disability, and medical care related to specific illness conditions; etc.

In this section the research program unquestionably accomplished its objectives to illuminate the need for medical care of population groups and on the volume and kind of medical services utilized by

persons covered by H.I.P. Moreover, the book, in reporting these findings, amply fulfils its purpose to describe in detail what was done and how it was accomplished. Definitive explanatory text is used as well as many necessary charts and tables which are liberally distributed throughout the entire report.

In overview, these comparisons indicate a more enlightened health-consciousness in H.I.P. families than in the other families studied. The longitudinal phase of the program will no doubt elicit more information on the impact of this consciousness on future morbidity within the groups. However, there appeared to be sufficient evidence to underscore the wisdom of the late Mayor Fiorello La Guardia of New York, who was instrumental in the creation of H.I.P.

The second major division is in effect a detailed handbook for those persons who would seek to make similar studies and are looking for valid guide lines by which to chart their work. All the schedules used are included, along with statements on the sampling design of the survey, methodology, description of content of IBM punch cards, etc.

This book is not recommended for reading in the generally accepted sense of diversion but is unhesitatingly indorsed for study by all persons seriously interested in the field of medical care. Because of its strict adherence to the requirements of scientific reporting, it is written in plain, unadorned language with careful, even scrupulous, awareness of responsibility for objectivity. Naturally, it requires disciplined reading of the type applied to the thoughtful examination of the findings of any well-planned and well-executed investigation.

Certainly, this book constitutes a welcome addition to the literature in a field where there has been too little intellectual productivity of this type and into which there needs to be more and more scientific inquiry reported in the professional manner of *Health and Medical Care in New York City*.

CHARLES E. BURBRIDGE
Washington, D.C.

Public Relations for Social Agencies. By HAROLD P. LEVY. New York: Harper & Bros., 1956. 209 pp. $3.50.

The importance of the social agency to the community it serves has long been inadequately known and inadequately explained, even to those directly concerned with the agency. Upon this premise, Mr. Levy has written an informative and provocative book, suggesting better public relations policies and public relations techniques for social agencies.

The author points out that many social agencies are so involved with performing their primary mission that they either neglect or forget the general public, and many times the agency feels that the general public simply is not interested. Consequently, when the agency goes to the public, as it invariably does, for financial support, it finds an ill-prepared and unresponsive group—a group quite wary about donating to an organization only heard from at fund-raising time.

Levy stresses quite strongly one factor necessary to an effective public relations program for any agency: the agency must know its publics. And, in knowing its publics, the agency must cater to their

wants and needs. For example, information disseminated to press, radio, and television may tell the agency's story, but the board of directors wants and is entitled to personalized informational service. Another public, the recipient of the agency's service, is more interested in how its needs are to be met than in the needs of the agency. Still another public, the agency employee and volunteer, requires an altogether different approach. The list of publics is long, and, of course, different agencies have different publics. The important thing is knowing how to deal properly with each one. As the book points out, many times newspaper, radio, and television fails as a public relations vehicle where a simple letter will succeed. Here is an obvious case where effectiveness depends on knowing the public particularly concerned.

The agency executive and the social worker often are too heavily involved in their primary duties to do an efficient public relations job. In view of this handicap, Levy points out the need for experienced public relations people in the field of social work. He explains the function of the public relations director and the public relations counsel in the social agency. He also explores methods in which the public relations counsel and the public relations director may work together on special projects.

For the agency which can afford neither public relations director nor counsel, the book contains tips on how volunteer workers and agency employees can combine their talents to tell the agency story. Carefully explained are methods in dealing with public relations media people. Behavior patterns of editors, program managers, and even congressmen are described, so that the agency can better reach them with their public relations presentation.

The reader is shown the importance of applying the "personal touch" in dealing with various publics. Often the solution to a particular problem is as simple as switching from mimeographed letters to more personalized typewritten or printed forms.

Levy takes a realistic attitude toward the social agency; he does not forget to count the costs. In fact, he includes in the book many practical money-saving suggestions. For example, he tells how an agency can produce a low-cost film through co-operation with university studios. He also suggests attractive methods of preparing mimeographed printed matter in order to save professional printing costs. Although his attitude toward public relations' costs is realistic and his suggestions have to do, in the main, with keeping costs down, the reader gets the impression that the author believes in spending money wisely, rather than in saving at any risk.

Another technique of public relations explored by the book is the use of "gimmicks" or stunts in the social agency field. While, at first thought, the reader will feel that the social agency is much too conservative an organization to employ stunts in its public relations programs, he will soon realize that even the "gimmick" can be employed with good taste. Since the general or citizen public is often unresponsive to the plain appeal of an agency's needs, the properly used "gimmick" sometimes will succeed where the conventional approach will fail.

In reading the book, it becomes obvious that Levy has had extensive experience in the fields of public relations and social work. He has prepared a careful record of case histories which should prove invaluable as guides to the agency-connected executive in preparing his public relations programs. The reader may not fully agree with all of Levy's suggestions, but he will have to agree that the author has made a sincere and worthwhile effort to present a public relations guide to social agencies.

Although the book is primarily a textbook, Levy has avoided the academic flavor and technical jargon that usually characterize this kind of publication. One gets the impression that Levy is a layman, writing for lay people. He does not waste words, and he packs a lot of information and advice into a relatively short (two-hundred-page) book. It is quick and easy reading and will be enjoyed by both public relations and agency people. While there are no panaceas offered, there are definite foundations for effective programs which can be tailored to suit almost any social agency.

Levy has written about two very young fields, the social agency and public relations. In a very efficient manner, he has described the vital importance of one to the other.

SISTER M. ADELE, O.S.F.
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BOOK REVIEWERS

OTTO L. BETTAG, M.D. Dr. Bettag, reviewer of *Human Problems of a State Mental Hospital*, is director of the Illinois Department of Public Welfare, Springfield, Illinois.

ARKELL B. COOK. Mr. Cook, who reviewed *Factors in Effective Administration*, is executive director of the Butterworth hospital in Grand Rapids, Michigan. He is a Fellow in the College.

LEIGH J. CROZIER, M.D. Dr. Crozier, who reports on the book, *Management in Action*, is the director of the Hermann hospital in Houston, Texas. He is a Fellow in the College.

H. S. MEHRING. Mr. Mehring is the business director of the Pennsylvania hospital, department of mental and nervous diseases, in Philadelphia. He reviewed *The Hidden Persuaders*. He is a Fellow in the College.

CHARLES E. BURBRIDGE. Mr. Burbridge, who reviewed *Health and Medical Care in New York City*, is superintendent of Freedman's hospital, Washington, D.C., and a Fellow in the College.

SISTER M. ADELE, O.S.F. Sister Adele is assistant administrator of the St. Francis general hospital and Rehabilitation Institute in Pittsburgh, Pennsylvania. She reviewed the book, *Public Relations for Social Agencies*. She is a Fellow in the College.

PUBLICATIONS RECEIVED

The following books and periodicals have been received and are listed to inform our readers of their publication and availability and also to acknowledge our appreciation to the publishers and organizations who sent them to us. Listing in these columns does not preclude reviews of some, but not all, of these publications in subsequent issues of this Journal.

The Chronically Ill. By Joseph Fox. New York: Philosophical Library, Inc., 1957. 229 pp. $3.95.

A comprehensive survey of some of the sociological factors involved in one of the most significant health problems facing the nation today.

Leadership in Administration. A Sociological Interpretation. By Philip Selznick. White Plains, N.Y.: Row, Peterson & Co., 1957. 162 pp. $4.00.

A concept of the nature of organization through leadership as opposed to authoritarian control and the influence the two theories wield upon world societies.

Modular Management and Human Leadership. By Frank Pieper. Minneapolis: Methods Press, 1958. 288 pp. $6.50.

A "how to" manual on the methods which foremen and supervisors can employ to provide "directive" or "creative" leadership.

Social Class and Mental Illness. A Community Study. By August B. Hollingshead and Frederick C. Redlich, M.D. New York: John Wiley & Sons, 1958. 442 pp. $7.50.

Volume One of two books that report the findings of a study conducted in New England on the relationship between an individual's mental illness and his social station in the community.

Assessing Managerial Potential. By the Foundation for Research on Human Behavior. Ann Arbor, Mich.: Foundation for Research on Human Behavior, 1958. 83 pp. $3.00.

A summary of two seminars held to research the efficiency of methods currently being used to appraise and predict the effectiveness of executive personnel.

Technique of Executive Control. By Erwin Haskell Schell. New York: McGraw-Hill Book Co., 1957. 357 pp. $5.50.

An outline of the practical fundamentals of executive techniques for dealing with subordinates, associates, and supervisors.

The Dynamics of Planned Change. By Ronald Lippitt, Jeanne Watson, and Bruce Wesley. New York: Harcourt, Brace and Company, 1958. 312 pp. $4.50.

An itemization of the theoretical and applied principles which can be used to effect improvements in a personality or social system.

Case Studies in Hospital Administration

Case studies of hospital problems that were prepared by candidates seeking advancement to the status of Fellowship in the American College of Hospital Administrators are published below and on the pages that follow. Members of the College and other persons who are interested in reviewing these studies or in obtaining more information about them are encouraged to write directly to the Members who prepared them—or to the College for the Members' affiliations. Because of the confidential nature of some of the case reports, they may not be available; you can find out by writing to the College.

Organizing an Employees' Agreement Committee To Prevent Unionization of Hospital Staff. Sister Rose Lethiecq, 1957.

Organizing a New Maintenance Department. Carl F. Wieler, 1957.

Organizing a New Recreational Program in a Children's Hospital. John C. Van Metre, 1957.

Organizing a School of Medical Technology. Sister Rita Clare, 1957.

Organizing the Staff To Gain Accreditation. Carl F. Wieler, 1957.

Organizing and Staffing an Emergency Room in a Small General Hospital. Max L. Hunt, 1957.

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Pre-admission Questionnaire of Maternity Patients as a Public Relations and Credit Device. A. C. O'Connor, 1957.

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